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JULY-AUGUST-SEPTEMBER
1953

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THE BULLETIN

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CLUB ROOT OF CRUCIFERS

GILBERT L. STOUT, *Chief*, GEORGE E. ALTSTATT, *Assistant Chief*, and ROY M. NAKAYAMA, *Assistant Plant Pathologist, Bureau of Plant Pathology, California Department of Agriculture*

The club root disease of crucifers, caused by a soil-inhabiting slime mold fungus known as *plasmodiophora brassicae* Wor., is so-called because of the club-like deformity of the roots in diseased plants. Although present in many parts of the world and more or less common in eastern and central United States, the known occurrence of the disease in California is limited to parts of the peninsular area of San Francisco and San Mateo Counties. According to Tompkins and Ark of the University of California (4), Professor Ralph E. Smith of that institution received, in 1905, a specimen of club root (*P. brassicae* Wor.) on turnip (*Brassica rapa* L.) from an unknown source in California. They stated that apparently this constitutes the earliest record on the occurrence of the disease in California. In his Report of the Plant Pathologist to July 1, 1906, Smith (3) in referring to cabbage, turnip and radish, stated

> "*Club Foot (Plasmodiophora brassicae).*—This trouble, which produces large swellings or tumors on the roots of these plants, occurs in this State but is not at all common."

More recently Tompkins and Ark (4) reported

> "On December 15, 1938, through the courtesy of Mr. Russell N. Murphy, agricultural inspector at Colma, specimens of club root on semi-mature cauliflower-broccoli (*Brassica oleracea* L. var. *botrytis* L.) plants of the purple-heading type were collected on a truck farm in San Francisco. According to the grower, the disease first appeared in 1931 in a small area (less than one-quarter of an acre in size), and since then approximately six acres have become infested. The method by which the organism was originally introduced into the soil in this locality has not been determined. Other crucifers which have shown marked susceptibility to the disease on this farm include cabbage (*B. oleracea* var. *capitata* L.), mustard (*B. Alba* (L.) Boiss), kohlrabi (*B. oleracea* var. *caulorapa* DC.), and the white-heading types of cauliflower-broccoli."

The disease has become of considerable economic importance in San Mateo County, where it is a limiting factor in the production of Brussels sprouts (*Brassica oleracea* var. *gemmifera* DC.) and other cruciferous vegetable crops. Surveys by state and county personnel and reports by the county agricultural commissioner have shown the disease to have occurred there on braschetti, Brussels sprouts, cabbage, cauliflower, sprouting broccoli, curly kale, Italian kale, curly mustard, and wild mustard (1). Although only members of the mustard family (Cruciferae) are affected, a large number of wild and economic species in that family are susceptible. The following are among the plants that have been listed as natural hosts (1, 2, 7).

Alyssum, sweet	*Lobularia maritima* (L.) Desv.†
Braschetti	*Brassica* sp.*
Broccoli (sprouting)	*Brassica oleracea* L. var. *botrytis* L.*
Brussels sprouts	*Brassica oleracea* L. var. *gemmifera* Zenker.*
Cabbage	*Brassica oleracea* L. var. *capitata* L.*
Cabbage, Chinese	*Brassica pekinensis* Rupr.*
Candytuft, annual	*Iberis umbellata* L.†
Cauliflower	*Brassica oleracea* L. var. *botrytis* L.*
Cress, marsh	*Rorippa islandica* (Murray) Borbas. Bess. ‡
Cress, winter	*Barbarea stricta* Andrz.*
Cress, yellow field	*Rorippa sylvestris* (L.) Bess. ‡
Dames violet	*Hesperis matronalis* L. ‡
False flax (small seeded)	*Camelina microcarpa* Andrz. ‡
False flax (large seeded)	*Camelina sativa* (L.) Crantz. ‡
Goldentuft	*Alyssum saxatile* L.†
Horseradish	*Armoracia rusticana* Gaertn., Mey. & Scherb.*
Kale	*Brassica oleracea* L. var. *viridis* L.*
Kale, curly	*Brassica oleracea* L. var. *acephala* DC.*
Kale, Italian	*Brassica* sp.*
Kale, Siberian	*Brassica campestris* L.*
Kohlrabi	*Brassica oleracea* L. var. *caulo-rapa* DC.*
Mustard, ball	*Neslia paniculata* (L.) Desv. ‡
Mustard, black	*Brassica nigra* (L.) Koch. ‡
Mustard, Chinese	*Brassica juncea* (L.) Coss.*
Mustard, common yellow	*Brassica campestris* L. ‡
Mustard, Hare's ear	*Conringa orientalis* (L.) Dumort. ‡
Mustard, hedge	*Sisymbrium officinale* (L.) Desv. ‡
Mustard, curly leaf	*Brassica juncea* (L.) Coss. var. *crispifolia* Bailey *
Mustard, pot-herb	*Brassica japonica* Siebold *
Mustard, tumbling	*Sisymbrium altisimum* L. ‡
Mustard, white	*Brassica alba* (L.) Boiss.*
Mustard, white	*Brassica hirta* Moench ‡
Mustard, wild	*Brassica kaber* (DC.) L. C. Wheeler ‡
Mustard, wild	*Sisymbrium vulgare* P. ‡
Pak-choi	*Brassica chinensis* L.*
Pennycress	*Thlaspi arvense* L. ‡
Peppergrass	*Lepidium apelatum* Willd. ‡
Peppergrass	*Lepidium Menziesii* DC. ‡
Pepper, bird's	*Lepidium virginicum* L. ‡
Pepper, poor man's	*Lepidium campestre* (L.) R. Br. ‡
Radish, garden	*Raphanus sativus* L.*
Rape	*Brassica napus* L.*
Rutabaga	*Brassica campestris* L. var. *napobrassica* (L.) DC.*
Shepherd's purse	*Capsella Bursa-pastoris* (L.) Medic. ‡
Stock	*Matthiola incana* R. Br.†
Stock, evening	*Matthiola bicornis* DC.†
Turnip	*Brassica rapa* L.*
Wallflower	*Cheiranthus Allionii* Hort.†
Wallflower	*Erysimum asperrimum* (Greene) Rydb. ‡
Wallflower	*Erysimum parviflorum* Nutt. ‡
Wallflower, garden	*Erysimum cheiranthoides* L.†
Wallflower, garden	*Erysimum perofskianum* Fisch. & Mey.†
Wallflower, western	*Erysimum asperum* DC.†

* Generally grown for human consumption or livestock feed.
† Generally grown for ornamental purposes.
‡ Generally considered as weed plants.

Affected plants wilt and may turn yellow and die (Fig. 1). In the early stages of infection, they may appear normal, but as the disease progresses, and as the stress of warm, drying weather comes on, they show distress. Symptoms vary with environmental conditions and with the host. The first aboveground symptom consists of flagging or wilting of the plant, especially noticeable during warm, drying periods or in the middle of warm, bright days. Before the disease becomes advanced a wilted plant may temporarily recover during the night or during cool, moist periods. This first indication of club root infection may not occur until a plant has attained considerable size, depending partly on how early in its life the plant became infected. The disease may progress to a considerable extent before aboveground signs are noticeable (6, 8).

The roots of infected plants become enlarged and deformed into "clubs" (Figs. 2 and 3) as a result of their having become infected by the fungus which causes the disease. The individual root enlargements often are more or less spindle-shaped. Eventually they decay. According to Walker (6) "The decay of the clubs leads to formation of materials toxic to the plant, especially in cabbage and cauliflower, and is one of the causes of wilting of the tops." In diseased fields the plants may die out in areas (Fig. 4), and entire plantings may be destroyed or rendered unprofitable. Since high soil moisture favors spore germination and root infection, the disease may be more abundant in fields or areas in fields where soil moisture is high.

Studies have been made by various workers on the effect of soil acidity and alkalinity in favoring or depressing development of the disease. *Plasmodiophora brassicae* long has been said to be most destructive in acid soils. The application of lime for control, or to minimize damage, has met with varying success and this method of control has limitations and has not been consistently effective. According to Wellman (8) some experiments have shown that the H-ion concentration could not be considered a limiting factor in disease control, although he found that hydrated lime applied at the rate of one-half ton per acre checked the disease noticeably, and two tons per acre gave a commercially satisfactory control in some soil. Root infections occur through spores of the club root fungus, and germination of the spores is reported to be inhibited in an alkaline medium. However, Wellman found "A H-ion concentration survey of 116 disease-infested soils showed that they occurred at a range of pH 5 to 7.8, which was also found to be the range covered by samples of cabbage-growing soils selected without respect to disease condition."

It seems likely that wherever cruciferous plants are grown successfully on a commercial scale the fungus causing club root may survive if once introduced. After the fungus is introduced, even if crop rotation is followed, susceptible cruciferous weeds may help it to persist in the soil. According to Walker (6) "There is no evidence that the fungus lives as a saprophyte in the soil or elsewhere; yet soils are known to remain infested for 10 years or longer without the presence of host plants. The fungus is one of the most persistent soil invaders, and crop rotation is of little value in control."

There is no cure for plants which have become infected. Control consists of preventing or suppressing infection. It is especially important that sanitary measures be practiced in the seed beds. The young

plants produced for transplanting should be grown only in soil which does not contain the fungus, and they should be transplanted into fields where the disease is not present. However, if healthy plants must be transplanted into infested soil, some benefit may be obtained by using bichloride of mercury in the transplant water at transplanting time (5, 6). This treatment is directed toward suppression of infection while the young plant is developing and establishing a root system. It is applied primarily to suppress the fungus in the root sphere area and especially to protect the young tap root from infection. The disease is particularly destructive when the tap root becomes diseased early in the life of the plant. The treatment, however, does not completely prevent infection, and is useful only in minimizing the effects of the disease. It is not a substitute for seed bed sanitation or for planting healthy transplants in disease-free soil.

A reliable, practical, and satisfactory method for field treatment of infested soil to eradicate the fungus from it is yet to be demonstrated.

Spread of the disease principally is through diseased transplants which become infected in infested seed beds. The fungus is not seed-borne. However, it can be carried about by any means which involves the movement of infested soil or infected plant material. Infested soil on plants, including root crops grown for food, or on farm equipment, or on the feet of man or animals, or carried by wind or in water can spread the disease. Irrigation water or drainage water can spread it from one field to another, or from one place to another in a field. The fungus can be carried in refuse from infected plants, especially root crops such as radishes and turnips, or in manure which has become contaminated from infected plant material.

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FIGURE 1. Normal and club root-infected plants of Brussels sprouts. Plant at left is severely diseased.

FIGURE 2. Young cruciferous plants affected with the club root disease. Note the "clubs" or enlarged and deformed roots.

FIGURE 3. Roots of Brussels sprouts plants which became severely affected with club root after being transplanted into infested soil as healthy plants from a clean seed bed.

FIGURE 4. Severely diseased area in field of sprouting broccoli affected with club root disease. Note severely affected plants and loss of plants because of the disease.

CHANGES IN DEPARTMENTAL PERSONNEL

Several important personnel changes have taken place in the Department of Agriculture during the past few months. Dr. C. U. Duckworth, Assistant Director, has been on leave of absence in Europe since April, 1952, as an advisor on livestock disease control problems with the Mutual Security Agency. The director appointed Dr. Ray E. Duckworth, former Livestock Disease Control Specialist with the department, to fill the temporary vacancy. Dr. C. U. Duckworth subsequently resigned to remain with the Mutual Security Agency and when Dr. Ray E. Duckworth retired on June 30, 1953, Mr. W. C. Jacobsen, Assistant to the Director, was appointed and the title changed to Deputy Director.

Dr. A. G. Boyd was chosen assistant director, filling the vacancy left by Mr. W. C. Jacobsen. Dr. J. E. Stuart was appointed Chief, Division of Animal Industry, to fill the vacancy left by Dr. A. G. Boyd, and Dr. H. P. Bonnikson, Chief, Bureau of Livestock Disease Control, to fill the vacancy left by Dr. J. E. Stuart. Dr. Herald G. Wixom became Assistant Chief of the Bureau of Livestock Disease Control on July 1st.

The position of Assistant Chief, Bureau of Entomology, was established, and Mr. Robert W. Harper was appointed. Mr. Elbert R. Jaycox was appointed to the position of Supervisor of Apiary Inspection April 13th, following the retirement on January 1st of Mr. H. M. Krebs.

When Mr. William H Graves, the Fiscal Officer for the department, passed away in March, Mr. C. H. Perkins was placed in charge, and following recent civil service examination the appointment was made permanent on August 6, 1953.—Chas. P. Cusick.

THE EFFECT OF DISPLAY CONDITIONS UPON THE VIABILITY OF PACKET SEEDS IN CALIFORNIA*

By Martin Suskin
Research Marketing Project, California Department of Agriculture

The California Department of Agriculture, in cooperation with members of the seed trade, initiated a project to study the effects that varying climatic conditions may have upon the viability of packet seeds.

Packets of seed for sale at retail are subject to greatly diversified display conditions. To determine the effect these conditions have upon them, several stocks of seed were acquired and packeted. These packets were then stored in the seven physiographic regions of California and periodic germination tests conducted to ascertain the loss in germination over a year's time.

All weather statistics in this report were supplied by the Weather Bureau, United States Department of Commerce, San Francisco, California. For a more comprehensive coverage of the weather data for the period August 1, 1951, to July 31, 1952, we suggest the Weather Bureau's publications "Climatological Data" and "Local Climatological Summary." Further information pertaining to seed storage and effects of humidity and temperatures on vegetable seeds can be found in the following U. S. D. A. publications:

U. S. Dept. Agri. Leaflet No. 220, issued May, 1942; Toole, E. H., Storage of Vegetable Seeds.

U. S. Dept. Agri. Tech. Bul. 708, 48 pp. illus. 1940; Boswell, V. R., Toole, E. H., Toole, V. K., and Fisher, D. F. A study of Rapid Deterioration of Vegetable Seeds and Methods for its Prevention.

We would like to thank the following seed companies for their cooperation in supplying the seed stocks, packets, and information needed in this study: F. F. Smith and Co., Sacramento; Germain's, Inc., Los Angeles; Northrup, King and Co., Berkeley and Minneapolis, Minnesota, and the county agricultural commissioners in the seven counties in which the packet seeds were stored.

Materials and Methods. Ten popular varieties of vegetable seeds were selected with the aid of the seed trade, with three of the varieties being duplicated and treated with an organic seed protectant—Arasan.

The seed stocks used contained a minimum of light, cracked, insect damaged and diseased seed. Each variety germinated above standard prior to distribution. These varieties are as follows: Tomato (*Lycopersicon esculentum*); Carrot (*Daucus carota*); Table beet (*Beta vulgaris*); Lettuce (*Lactuca sativa*); Cabbage (*Brassica oleracea capitata*); Onion

* For this project, state funds were matched with federal funds received from the Production and Marketing Administration, U. S. D. A., under provisions of the Agricultural Marketing Act of 1946.

(*Allium cepa*); Radish (*Raphanus sativus*); Sweet corn (*Zea mays*); Garden beans (*Phaseolus vulgaris*) and Cucumber (*Cucumis sativus*).

Duplicate stocks of the same lots of bean and cucumber were treated with Arasan dust at 2 oz/100 lbs. of seed. The sweet corn was treated with a standard Arasan slurry treatment. Each seed stock was thoroughly mixed with a representative sample drawn and sent into the State Seed Laboratory for germination test. The seeds were then packeted and placed in cartons, using standard paper packets and cardboard cartons. Silica jell was used to seal the packets and cartons. Each packet, with the exception of garden bean, contained a minimum of 400 seeds. Forty-five packets were made up for each seed stock. Three packets of each stock were selected at random and maintained as a check in a steel box on the second floor of State Office Building No. 1, Sacramento, California. The remaining packets were divided at random into seven lots of two series each, one series to be stored under the best conditions available at the location, that is, packets protected from extreme temperature and changes of temperature as nearly as possible, and from sun and atmosphere. The second series to be stored under the most exposed conditions at the location, that is, exposed to sun and atmosphere if possible; exposed to extreme temperatures and changes in temperature if available. The packets were then delivered to the agricultural commissioners in the localities selected as representative of the region involved.

The protected series were placed in commercial cardboard boxes such as packets of seed are stored in and shipped. The exposed series were contained in a quarter-inch mesh hardware cloth cage approximately 24 inches long, 10 inches high and 6 inches deep. Each four months one packet or carton was selected at random from each of the varieties from both "Exposed" and "Protected" and forwarded to the State Seed Laboratory for germination test. The packets were maintained at the storing locales for one year. The sites used were:

Coastal Area:
North Coast—Eureka, Humboldt County
Central Coast—Watsonville, Santa Cruz County
South Coast—Los Angeles, Los Angeles County

Interior Valleys:
San Joaquin Valley—Fresno, Fresno County
Sacramento Valley—Marysville, Yuba County

Desert Region:
Blythe, Riverside County

Intermountain Region:
Alturas, Modoc County

Check:
State Seed Laboratory, Sacramento

RESULTS

North Coast, Eureka, Humboldt County. The climate at Eureka is completely maritime and with high humidity. The year is divided into the rainy season and the dry season. The rainy season begins in October and continues through April, and approximately 36 inches of the normal 40 inches of precipitation falls during this period. The dry season

extends from May through September and is marked by considerable fog or low cloudiness. Usually, however, there will be six to eight hours of mid-morning clearing during this season.

Temperatures are moderate during the entire year—the usual range being from a low of about 35 degrees F. to a high of about 75 degrees F. The daily range of temperatures is generally very small, often not over two or three degrees.

During the period of storage (August 1, 1951, to July 31, 1952) 47 inches of precipitation fell, slightly higher than the yearly average. The daily maximum, daily minimum and monthly averages were normal. The relative humidity figures in Table 1 are a 62-year average. No figures were available for the period of storage.

Table 1 shows temperature and precipitation data compiled from the U. S. Weather Bureau's "Climatological Data" for the City of Eureka. The relative humidity data was taken from "Local Climatological Summary," U. S. Department of Commerce, Weather Bureau, compiled under the direction of Ivan E. Anderson, Chattanooga, 1952.

The protected series of packets were stored in a storeroom at the Agricultural Commissioner's Office. The exposed series of packets in the hardware cloth container were nailed to the wall of the back porch of the office where the packets were exposed for one full year to everything in the way of climatic conditions except direct rain.

Table 2 shows the germination percentages by quarterly intervals for each of the seed varieties stored at the North Coast location. It will be noted that on the 12-month test there is a definite loss of germination in the exposed series of lettuce, carrot, and onion as compared to the protected series and checks. A minor loss of viability occurred in the exposed cabbage, and treated and untreated cucumber. All of the seed stocks were above standard [1] except for the lettuce which was 30 percentage points below, and for onion which was one-half percent below standard. The greatest loss of viability in the carrot and lettuce seeds occurred during the first and last four months of storage, while the onion seed lost the greatest viability during the last four months. The exposed packets of cabbage and cucumber (Arasan treated and untreated) show a trend of declining vigor through each test. The sweet corn, considered a short-lived seed, lost no viability during the year of storage. All protected varieties at this location maintained good quality of germination at the end of the year.

[1] Vegetable Seed Germination Standards—Section 3900, Schedule II of Rules and Regulations of the Director of Agriculture ("California Seed Law and Regulations") contained in Title 3, California Administrative Code, pages 342 to 369, inclusive. Effective July 26, 1950.

Table 1

Monthly Temperatures, Precipitation, and the 62-year Average Relative Humidity Figures for the City of Eureka

Month	Temperatures					Total precipitation, inches	Relative humidity*	
	Averages			Extremes				
	Daily Maximum °F.	Daily minimum °F.	Monthly °F.	Highest °F.	Lowest °F.		4:30 a.m. P.S.T.	4:30 p.m. P.S.T.
Aug., 1951	59.1	51.7	55.4	65	49	.02	92	81
Sept., 1951	59.0	51.1	55.1	68	47	.79	91	80
Oct., 1951	60.6	49.3	55.0	71	41	3.88	90	80
Nov., 1951	57.8	46.1	52.0	71	36	7.80	88	80
Dec., 1951	52.1	40.9	46.5	62	30	9.10	86	79
Jan., 1952	50.6	39.4	45.0	65	30	10.67	86	78
Feb., 1952	52.9	41.2	47.1	65	31	6.22	87	78
Mar., 1952	50.5	39.9	45.2	56	32	3.78	87	76
Apr., 1952	54.8	44.3	49.6	66	38	1.34	87	76
May, 1952	57.8	47.4	52.6	78	39	1.77	89	77
June, 1952	57.9	49.5	53.7	61	43	1.98	90	77
July, 1952	59.2	51.4	55.3	66	48	T.	91	79
Annual	56.02	46.0	51.04	78	30	47.35		

* Sixty-two years of record.

Central Coast, Watsonville, Santa Cruz County. The weather at Watsonville is somewhat maritime in nature. The relative humidity is fairly high during the entire year, with moderate temperatures. During the period of storage (August 1, 1951, to July 31, 1952) 30.21 inches of precipitation were recorded with 28.5 inches falling during the rainy season, from October to April. This is approximately 10 inches over the 58 yearly average. For this same period the annual daily maximum and minimum temperatures were 65.1 degrees F. and 44.70 degrees F. respectively, the annual monthly average being 54.9 degrees F. The extremes were a high of 97 degrees F. and a low of 24 degrees F. Humidity figures were unavailable. Table 3.

The protected series of vegetable seeds were stored on a shelf in the storeroom of the Agricultural Commissioner's Office. The exposed series in the hardware cloth cage were hung on the wall of an open-end wooden garage, where the packets were exposed to full climatic conditions except direct rain and full sunshine.

Table 4 shows the germination percentages of each seed stock at quarterly intervals. Here again, a loss of viability is noted for the exposed packets of carrot and lettuce on the final test. The carrot lost 17 percentage points and the lettuce 29 percentage points. The carrot is still above standard but the lettuce is 19 points below the State Seed Law standard. The exposed packet of onion seed on the final test, though above standard, shows a 13.50 percent drop in viability. The exposed packet of beet, applying the allowable tolerance, is slightly below the

Table 2

Germination Percentages at Four-month Intervals of All Seed Stocks Stored at Eureka

		Initial germination 8-1-51	4 months 8-1-51 to 12-1-51	8 months 8-1-51 to 4-1-52	12 months 8-1-51 to 8-1-52
Tomato	Check	97.50	94.75	94.50	95.25
	Protected		94.00	93.25	96.00
	Exposed		93.25	90.25	91.50
Carrot	Check	89.25	84.25	88.00	87.00
	Protected		79.75	86.00	81.00
	Exposed		78.00	77.25	66.25
Lettuce	Check	93.00	89.00	89.50	89.75
	Protected		83.00	92.75	87.25
	Exposed		74.00	66.75	50.50
Onion	Check	91.00	94.75	94.75	92.75
	Protected		93.50	93.25	87.75
	Exposed		89.75	86.00	69.50
Beet	Check	93.00	91.75	90.25	97.25
	Protected		91.50	89.75	94.25
	Exposed		91.00	85.25	89.25
Cabbage	Check	94.75	94.75	93.25	91.00
	Protected		89.50	90.50	94.25
	Exposed		87.25	85.50	78.00
Radish	Check	96.25	98.75	98.25	99.75
	Protected		98.00	97.75	98.75
	Exposed		98.00	96.75	95.75
Garden bean	Check	87.50	81.50	87.00	86.50
	Protected		81.25	83.00	80.25
	Exposed		79.50	83.75	80.25
Garden bean*	Check	86.00	75.00	85.00	81.50
	Protected		74.50	83.00	80.50
	Exposed		78.00	88.00	81.50
Sweet corn	Check	93.75	94.50	93.75	94.50
	Protected		95.00	94.00	96.00
	Exposed		95.25	89.75	93.50
Sweet corn*	Check	95.00	97.50	94.75	93.00
	Protected		96.00	94.75	96.25
	Exposed		94.75	91.75	94.75
Cucumber	Check	94.00	91.50	94.50	94.50
	Protected		91.50	92.75	92.50
	Exposed		90.25	88.00	84.50
Cucumber*	Check	95.75	92.25	94.75	92.50
	Protected		93.50	93.50	93.00
	Exposed		89.50	85.75	78.75

* Arasan treated.

final test conducted on the check and one-quarter percent below the initial germination. Generally, the exposed packets of beet, cabbage, and cucumber (Arasan treated and untreated) show a trend of lowering viability on the final test. There is a 17 percent drop in the exposed untreated garden bean under the check on the final test. This is below the standard of 75 percent germination for garden beans. Applying tolerance brings this 3 percentage points over the standard, 12 percent of this 17-point drop being due to an increase of weak sprouts,[1] and 4 percent to an increase of baldheads.[2] This variation may be due to damage en route to the seed laboratory for testing, or to variation within the seed stock. You will note that replications of the seed stock, one packet under the same conditions at this site and two replication exposed at Eureka, maintained fairly good viability at the end of the year. This leads to the belief that at least a portion of the 17-point drop was due to other than climatic factors at Watsonville. All protected packets of seed or packets stored indoors at this location maintained their viability qualities very well at the end of the storage period.

Table 3

Monthly Temperatures and Precipitation Figures for the Period of Storage at Watsonville

Month	Temperature					Total precipitation, inches
	Averages			Extremes		
	Daily maximum °F	Daily minimum °F	Monthly °F	Highest °F	Lowest °F	
Aug., 1951	66.4	52.1	59.3	71	47	.04
Sept., 1951	71.0	51.8	61.4	97	46	.04
Oct., 1951	74.2	46.2	60.2	92	39	1.05
Nov., 1951	65.3	43.0	54.2	83	24	3.47
Dec., 1951	57.4	37.8	47.6	67	28	8.52
Jan., 1952	55.2	36.8	46.0	68	27	8.96
Feb., 1952	60.9	39.7	50.3	74	32	2.79
Mar., 1952	59.8	38.9	49.4	79	31	3.96
Apr., 1952	64.9	45.1	55.0	87	35	.96
May, 1952	69.4	46.0	57.7	87	35	.19
June, 1952	66.0	47.5	56.8	87	38	.22
July, 1952	70.1	51.9	61.0	83	46	.01
Annual	65.0	44.7	54.9	97	24	30.21

[1] A weak sprout is defined as any seedling that will not make a normal plant.
[2] A baldhead is defined as a seedling which has no primary leaves and no epicotyle or growing point.

Table 4

Germination Percentages at Four-month Intervals of Seed Stocks Stored at the Agricultural Commissioner's Office at Watsonville, Santa Cruz County

		Initial germination 8-1-51	4 months 8-1-51 to 12-1-51	8 months 8-1-51 to 4-1-52	12 months 8-1-51 to 8-1-52
Tomato	Check	97.50	94.75	94.50	95.25
	Protected		95.25	95.50	95.25
	Exposed		92.00	89.25	90.00
Carrot	Check	89.25	84.25	88.00	87.00
	Protected		89.25	87.25	81.50
	Exposed		83.00	79.50	70.50
Lettuce	Check	93.00	89.00	89.50	89.75
	Protected		87.50	90.25	89.50
	Exposed		78.50	73.75	61.00
Onion	Check	91.00	94.75	94.75	92.75
	Protected		92.25	94.50	88.50
	Exposed		92.50	89.00	79.25
Table beet	Check	93.00	91.75	90.25	97.25
	Protected		91.00	90.75	94.25
	Exposed		91.50	88.00	85.75
Cabbage	Check	94.75	94.75	93.25	91.00
	Protected		91.00	92.25	92.25
	Exposed		87.00	87.25	80.00
Radish	Check	96.25	98.75	98.25	99.75
	Protected		98.75	98.00	98.75
	Exposed		98.75	96.00	95.75
Garden bean	Check	87.50	81.50	87.00	86.50
	Protected		77.00	81.50	81.25
	Exposed		78.00	83.50	69.00
Garden bean*	Check	86.00	75.00	85.00	81.50
	Protected		82.00	79.50	85.50
	Exposed		72.25	80.50	84.50
Sweet corn	Check	93.75	94.50	93.75	94.50
	Protected		95.25	89.75	92.75
	Exposed		94.25	91.25	94.00
Sweet corn*	Check	95.00	97.50	94.75	93.00
	Protected		96.00	93.75	94.75
	Exposed		95.50	93.00	95.25
Cucumber	Check	94.00	91.50	94.50	94.50
	Protected		93.25	95.25	93.50
	Exposed		92.25	87.00	80.75
Cucumber*	Check	95.75	92.25	94.75	92.50
	Protected		93.75	93.00	91.75
	Exposed		92.75	88.00	84.25

* Arasan treated.

Table 5

Monthly Temperatures, Precipitation, and Relative Humidity Figures for the Period of Storage at Los Angeles

	Temperatures†					Total precipitation, inches	Relative humidity*			
	Averages			Extremes						
	Daily maximum °F	Daily minimum °F	Monthly °F	Highest °F	Lowest °F		4.30 a.m. P.S.T.	10.30 a.m. P.S.T.	4.30 a.m. P.S.T.	10.30 a.m. P.S.T.
Aug., 1951	81.4	61.2	71.3	93	57	.15	85	66	68	82
Sept, 1951	81.3	60.7	71.0	92	57	0.00	86	66	70	82
Oct., 1951	79.5	58.1	68.8	96	50	0.59	82	51	65	80
Nov., 1951	71.2	52.6	61.9	86	44	.29	78	53	65	78
Dec., 1951	62.5	46.1	54.3	70	32	5.80	73	54	61	72
Jan., 1952	61.0	44.6	52.8	76	35	10.03	80	59	65	76
Feb., 1952	67.4	50.1	58.8	81	40	.63	67	47	56	67
Mar., 1952	63.6	47.0	55.3	86	40	6.14	79	55	59	75
Apr., 1952	69.8	52.4	61.1	89	48	1.58	88	67	69	82
May, 1952	76.8	56.6	66.7	83	52	Trace	87	63	70	85
June, 1952	74.3	57.1	65.7	89.0	53	Trace	85	63	65	81
July, 1952	83.5	61.0	72.3	93	54	Trace	90	67	70	86
Annual	72.69	56.21	63.33	96	32	26.21				

* Los Angeles W. B. Airport, Burbank.
† Los Angeles W. B., City.

South Coast, Los Angeles, Los Angeles County. The protected series of seed were stored at the Agricultural Commissioner's Office, 507 Aliso St., Los Angeles, in a supply cabinet in a heated office. The exposed series were stored at Rivera approximately 10 miles southeast of the commissioner's office. These packets were stored in a building of hollow concrete tile construction and placed in a west window where the seed packets received full afternoon sun. The room was well ventilated with outside air. Humidity averaged approximately 40 percent during the period of storage and temperatures ranged from approximately 40 degrees F. to 80 degrees F. with an annual average of 60 degrees F.[1]

The climate in the south coast area is of a Mediterranean nature, with the major portion of the precipitation falling from November to April. Table 5. From August 1, 1951, to July 31, 1952, 26 inches of precipitation were recorded with about 25 inches recorded during the rainy season. This was approximately 10 inches more than the 74-year average. During the same period the annual daily maximum average and minimum were 73 degrees F. and 56 degrees F. The yearly monthly mean was 63 degrees F. The extremes were a high of 96 degrees F. and a low of 32 degrees F. The humidity in this area is fairly high in the evenings and early hours of the morning and then falls rapidly to a yearly average of approximately 49 percent at noon. The humidity data in Table 5 was recorded at the Los Angeles Airport at Burbank and may not be too indicative since the exposed seed packets were stored at Rivera, 20 miles southeast of this location.

[1] Weather data supplied by the Los Angeles County Agricultural Commissioner.

Table 6

Germination Percentages at Four-month Intervals of Seed Stocks Stored by the Agricultural Commissioner's Office at Los Angeles, Los Angeles County

		Initial germination 8-1-51	4 months 8-1-51 to 12-1-51	8 months 8-1-51 to 4-1-52	12 months 8-1-51 to 8-1-52
Tomato	Check	97.50	94.75	94.50	95.25
	Protected		94.75	91.00	96.75
	Exposed		93.75	88.75	94.00
Carrot	Check	89.25	84.25	88.00	87.00
	Protected		83.75	83.25	82.50
	Exposed		82.75	83.25	78.50
Lettuce	Check	93.00	89.00	89.50	89.75
	Protected		89.75	83.75	88.75
	Exposed		88.50	86.25	83.25
Onion	Check	91.00	94.75	94.75	92.75
	Protected		93.25	94.50	85.25
	Exposed		92.50	94.00	91.00
Beet	Check	93.00	91.75	90.25	97.25
	Protected		96.00	90.75	95.50
	Exposed		88.75	93.75	96.50
Cabbage	Check	94.75	94.75	93.25	91.00
	Protected		88.25	94.00	90.75
	Exposed		84.00	94.00	94.50
Radish	Check	96.25	98.75	98.25	99.75
	Protected		96.25	98.50	98.25
	Exposed		97.75	98.00	97.25
Garden bean	Check	87.50	81.50	87.00	86.50
	Protected		81.25	79.00	81.00
	Exposed		83.00	85.00	80.00
Garden bean*	Check	86.00	75.00	85.00	81.50
	Protected		76.00	81.50	83.00
	Exposed		76.50	84.00	85.00
Sweet corn	Check	93.75	94.50	93.75	94.50
	Protected		94.00	95.25	91.00
	Exposed		97.50	95.75	93.25
Sweet corn*	Check	95.00	97.50	94.75	93.00
	Protected		95.75	95.75	95.25
	Exposed		94.00	92.00	91.75
Cucumber	Check	94.00	91.50	94.50	94.50
	Protected		93.75	97.00	94.00
	Exposed		93.25	91.00	92.50
Cucumber*	Check	95.75	92.25	94.75	92.50
	Protected		93.00	93.25	90.75
	Exposed		92.25	92.75	92.75

* Arasan treated.

Table 6 shows the germination percentages for the seed packets at four-month intervals. At the end of a year all seed stocks in both series germinated fairly well. There appears to be a minor drop on the final test of exposed carrot seed. This packet is still 23.50 percent above the standard for carrot. In the main, both series maintained good qualities of germination.

Table 7

Monthly Temperature, Precipitation, and Relative Humidity Figures for the Period of Storage at Fresno

Month	Temperatures					Total precipitation, inches	Relative humidity			
	Averages			Extremes						
	Daily maximum °F	Daily minimum °F	Monthly °F	Highest °F	Lowest °F		4.30 a.m. P.S.T.	10.30 a.m. P.S.T.	4.30 a.m. P.S.T.	10.30 a.m. P.S.T.
Aug., 1951	95.8	60.0	77.9	104	54	0.00	75	43	24	51
Sept., 1951	92.6	57.4	75.0	103	50	0.00	81	48	28	60
Oct., 1951	79.7	46.5	63.1	98	37	.33	80	46	32	66
Nov., 1951	69.1	41.9	55.5	85	32	1.03	89	66	53	82
Dec., 1951	54.4	35.1	44.8	68	25	2.82	94	79	70	93
Jan., 1952	54.4	36.0	45.2	67	24	3.59	91	78	69	91
Feb., 1952	61.4	38.3	49.9	73	29	.53	92	70	53	86
Mar., 1952	60.3	39.9	50.1	82	30	3.57	92	66	53	84
Apr., 1952	73.7	48.1	60.9	92	40	2.07	89	57	45	77
May, 1952	85.8	53.4	69.6	99	42	Trace	74	42	26	49
June, 1952	83.8	54.3	69.1	100	47	.01	76	45	28	53
July, 1952	97.8	65.5	81.7	103	55	Trace	70	47	28	49
Annual	75.7	48.0	61.9	104	24	13.95				

Interior Valley, Fresno, Fresno County. The climate at Fresno is of the winter rainfall or Mediterranean type. During the period of storage (August 1, 1951, to July 31, 1952) 14 inches of precipitation were recorded, 13.5 inches of which fell from November to April. During this same period the annual daily maximum and minimum temperatures were 76 degrees F. and 48 degrees F., respectively. The annual monthly mean was 62 degrees F. The extremes were a high of 104 degrees F. and a low of 24 degrees F. Humidity is generally low in late spring, summer and early fall months, and is generally high in the winter. This high humidity is maintained during the winter by so-called tule fogs and period of heavy storms. Table 7 gives a few of these climatic statistics.

The protected series of packet seeds were stored within a closet on the premises of the Agricultural Commissioner's Office at Fresno. This room was heated during the winter. The exposed series of packets in the hardware cloth cage were placed on a stand built by the commissioner and placed at the north end of the office where it was continuously exposed to all climatic conditions.

During the period of storage some of the packets and cartons of seed in the exposed series were wet by a sudden rain storm in varying degrees, depending on where they were situated in the hardware cloth cage. The damaging rain occurred just prior to the April 1st, or eight-month test. Some of the packets that did get wet maintained viability to the final test. Beet and tomato are examples. The exposed carrot showed a trend toward lowering germination. How much can be attributed to the rain damage cannot be determined. The onion seed on the final test showed a slight decline. This test is still above standard, and applying tolerance brings the germination up to 91.50 percent. The onion check

Table 8

Germination Percentages at Four-month Intervals of Seed Stocks Stored at Fresno by the County Agricultural Commissioner

		Initial germination 8-1-51	4 months 8-1-51 to 12-1-51	8 months 8-1-51 to 4-1-52	12 months 8-1-51 to 8-1-52
Tomato	Check	97.50	94.75	94.50	95.25
	Protected		95.25	92.25	94.75
	Exposed		90.75	94.75	90.50†
Carrot	Check	89.25	84.25	88.00	87.00
	Protected		83.00	87.25	80.25
	Exposed		85.57	72.50	63.50†
Lettuce	Check	93.00	89.00	89.50	89.75
	Protected		88.25	83.00	89.50
	Exposed		86.75	72.75	77.75
Onion	Check	91.00	94.75	94.75	92.75
	Protected		92.75	93.75	91.00
	Exposed		92.00	94.75	84.00
Table beet	Check	93.00	91.75	90.25	97.25
	Protected		89.50	91.25	90.00
	Exposed		87.50	87.25	90.50
Cabbage	Check	94.75	94.75	93.25	91.00
	Protected		90.75	93.00	95.25
	Exposed		89.00	85.75	82.50
Radish	Check	96.25	98.75	98.25	99.75
	Protected		97.00	97.75	99.00
	Exposed		98.50	97.50	94.50
Garden bean	Check	87.50	81.50	87.00	86.50
	Protected		74.25	86.50	84.00
	Exposed		71.25	68.00	33.50†
Garden bean*	Check	86.00	75.00	85.00	81.50
	Protected		73.50	83.00	82.50
	Exposed		80.50	80.50	80.00†
Sweet corn	Check	93.75	94.50	93.75	94.50
	Protected		91.75	94.75	87.75‡
	Exposed		94.50	82.00	61.25†
Sweet corn*	Check	95.00	97.50	94.75	93.00
	Protected		94.50	94.50	96.25
	Exposed		95.00	92.25	94.75
Cucumber	Check	94.00	91.50	94.50	94.50
	Protected		94.75	94.25	96.50
	Exposed		94.75	89.75	94.25
Cucumber*	Check	95.75	92.25	94.75	92.50
	Protected		93.25	91.00	90.75
	Exposed		92.50	91.25	87.50

* Arasan treated.
† Rain damage.
‡ Buffalo carpet beetle (*Anthrenus* spp.) damage.

germination was 92.75 percent. The exposed cabbage packet showed a slight trend of falling viability. These packets were also wet. The exposed untreated garden bean showed the greatest loss of viability, approximately 66 percent of the seed failing to germinate. This high percentage rotted in the germination media. The Arasan-treated packet loss was 11.50 percent over the check. This loss was manifested in an increase

of baldheads and weak sprouts. The protected untreated sweet corn was infested with larvae of the Buffalo carpet beetle (*Anthrenus* spp.) which dropped viability of the sweet corn. The exposed untreated sweet corn was rain damaged. Except for the sweet corn, all protected packets maintained good germination qualities at the end of the storage period.

Table 9

Monthly Temperature and Precipitation Figures for the Period of Storage at Marysville

Month	Temperature					Total precipitation, inches
	Averages			Extremes		
	Daily maximum °F	Daily minimum °F	Monthly °F	Highest °F	Lowest °F	
Aug., 1951	94.3	57.0	75.7	107	51	.00
Sept., 1951	91.9	55.2	73.6	106	47	.00
Oct., 1951	76.5	47.3	61.9	89	38	4.43
Nov., 1951	63.9	41.7	52.8	77	34	3.18
Dec., 1951	53.5	37.1	45.3	62	26	4.81
Jan., 1952	49.7	36.4	43.1	61	26	9.47
Feb., 1952	58.2	39.7	49.0	71	33	2.84
Mar., 1952	60.7	40.6	50.7	82	31	4.36
Apr., 1952	72.2	47.7	60.0	88	41	1.09
May, 1952	83.2	53.3	68.3	97	41	.24
June, 1952	81.4	54.0	67.7	100	45	.68
July, 1952	95.2	63.3	79.3	107	56	.03
Annual	73.4	47.8	60.6	107	26	31.13

Sacramento Valley, Marysville, Yuba County. The climate at Marysville is of the winter rainfall type, with most of the precipitation falling from October to April. The average annual rainfall is about 20 inches but during the period of storage approximately 31 inches were recorded. During this same period the annual mean daily maximum and minimum temperatures were 73.4 degrees F. and 47.8 degrees F. respectively, and the annual mean monthly temperature was 60.6 degrees F. The extremes for this period were 107 degrees F. and 26 degrees F. The relative humidity is generally low in late spring, summer and early fall, and high during the winter months. As at Fresno, this high humidity is caused by fog and periods of heavy storms. No relative humidity figures were available during the storage period at Marysville. Table 9.

The protected series of seed packets were stored within a supply closet on the premises of the Agricultural Commissioner's Office, Old County Hospital, Marysville. The exposed series in the hardware cloth cage were hung underneath the metal roof eaves of the commissioner's storage shed where, for the full tenure of storage, the seed packets were exposed to all climatic conditions, except direct rainfall.

Table 10 shows at four-month intervals the germination percentages of these two series of seed packets plus the check maintained under ideal storage conditions at the Sacramento Seed Laboratory. There was

Table 10

Germination Percentages at Four-month Intervals of Seed Stocks Stored at Marysville by the County Agricultural Commissioner

		Initial germination 8-1-51	4 months 8-1-51 to 12-1-51	8 months 8-1-51 to 4-1-52	12 months 8-1-51 to 8-1-52
Tomato	Check	97.50	94.75	94.50	95.25
	Protected		92.50	93.25	96.75
	Exposed		93.00	92.75	93.00
Carrot	Check	89.25	84.25	88.00	87.00
	Protected		80.25	86.50	84.25
	Exposed		80.25	81.00	79.00
Lettuce	Check	93.00	89.00	89.50	89.75
	Protected		91.25	90.50	87.75
	Exposed		90.50	79.00	77.25
Onion	Check	91.00	94.75	94.75	92.75
	Protected		91.50	95.00	89.25
	Exposed		93.50	94.50	83.75
Table beet	Check	93.00	91.75	90.25	97.25
	Protected		89.75	90.75	94.25
	Exposed		93.00	88.75	91.00
Cabbage	Check	94.75	94.75	93.25	91.00
	Protected		88.75	92.25	92.25
	Exposed		87.50	87.25	82.25
Radish	Check	96.25	98.75	98.25	99.75
	Protected		97.75	98.00	98.75
	Exposed		98.50	97.75	98.50
Garden bean	Check	87.50	81.50	87.00	86.50
	Protected		77.50	83.50	84.50
	Exposed		83.25	81.75	81.50
Garden bean*	Check	86.00	75.00	85.00	81.50
	Protected		75.50	82.50	83.00
	Exposed		78.50	86.00	81.00
Sweet corn	Check	93.75	94.50	93.75	94.50
	Protected		95.25	91.75	92.00
	Exposed		96.00	94.75	92.00
Sweet corn*	Check	95.00	97.50	94.75	93.00
	Protected		95.00	93.25	93.75
	Exposed		95.75	91.25	92.25
Cucumber	Check	94.00	91.50	94.50	94.50
	Protected		93.00	94.75	91.50
	Exposed		93.50	90.75	89.50
Cucumber*	Check	95.75	92.25	94.75	92.50
	Protected		91.75	92.50	93.25
	Exposed		93.00	91.50	88.75

* Arasan treated.

a general small drop in viability on the final test of exposed carrot, lettuce, onion, and cabbage seed stocks. All of these were still above standard except the lettuce which fell 3.75 percentage points below. All packets stored indoors at this site germinated about the same as the checks.

Table 11

Monthly Temperature and Precipitation Figures for the Period of Storage at Alturas

Month	Temperature					Total precipitation, inches
	Averages			Extremes		
	Daily maximum °F	Daily minimum °F	Monthly °F	Highest °F	Lowest °F	
Aug., 1951	87.2	44.1	65.7	99	31	.35
Sept., 1951	83.6	36.9	60.3	94	30	.00
Oct., 1951	60.9	30.2	45.6	81	19	1.95
Nov., 1951	52.2	25.0	38.6	71	15	1.05
Dec., 1951	37.9	16.7	27.3	50	— 5	3.00
Jan., 1952	34.8	12.8	23.8	48	—16	2.75
Feb., 1952	41.8	16.0	28.9	53	— 3	2.60
Mar., 1952	43.5	20.8	32.2	61	6	3.45 E
Apr., 1952	62.7	31.7	47.2	76	24	.83
May, 1952	70.3	37.8	54.1	84	27	.48
June, 1952	71.5	41.6	56.6	88	27	4.63
July, 1952	86.8	50.1	68.5	99	41	1.21
Annual	61.1	30.3	45.7	99	— 5	22.30 E

E—Water equivalent of snowfall wholly or partly estimated, using a ratio of 1 inch of water equivalent to every 10 inches of snowfall.

Intermountain Area, Alturas, Modoc County. The climate at Alturas is a typical intermountain type. The annual mean snowfall is 40.5 inches, and the annual precipitation is 12.5 inches. Using a ratio of one inch of water to 10 inches of snowfall, the total annual mean precipitation is approximately 17 inches. During the period of storage (August 1, 1951, to July 31, 1952), approximately 22 inches of precipitation were recorded. During this same period the annual mean maximum and minimum temperatures were 61.1 degrees F. and 30.3 degrees F. The annual mean monthly temperature was 45.7 degrees F. The extremes for this period were a high of 99 degrees F. and a low of —5 degrees F. The relative humidity at this location is fairly low all year. Table 11.

Table 12 shows the germination percentages of the seed stocks stored at Alturas by quarterly intervals. The protected series of packets were stored within a supply closet on the premises of the Agricultural Commissioner's office at Alturas. The exposed series of seed stocks in the hardware cloth cage were placed in a wooden garage, where the packets were exposed to all weather conditions except sunlight. All seed packets maintained good quality of germination at this location. There was a slight drop on the final test of exposed cabbage seed but the seed was still above standard. The final test on the protected carton of untreated garden bean showed a small drop in germination but here again the drop was within tolerance. In general, both exposed and protected packets of vegetable seeds maintained good viability at the end of the storing period.

Table 12

Germination Percentages at Four-month Intervals of Seed Stocks Stored at Alturas by the Agricultural Commissioner of Modoc County

		Initial germination 8-1-51	4 months 8-1-51 to 12-1-51	8 months 8-1-51 to 4-1-52	12 months 8-1-51 to 8-1-52
Tomato	Check	97.50	94.75	94.50	95.25
	Protected		95.50	82.50	95.00
	Exposed		94.25	89.75	94.00
Carrot	Check	89.25	84.25	88.00	87.00
	Protected		84.25	82.75	83.00
	Exposed		83.50	81.75	84.00
Lettuce	Check	93.00	89.00	89.50	89.75
	Protected		85.50	87.00	90.25
	Exposed		90.25	90.50	84.00
Onion	Check	91.00	94.75	94.75	92.75
	Protected		94.75	87.75	91.50
	Exposed		92.75	95.50	90.00
Table beet	Check	93.00	91.75	92.25	97.25
	Protected		86.75	92.00	93.00
	Exposed		90.50	88.25	91.25
Cabbage	Check	94.75	94.75	93.25	91.00
	Protected		93.50	93.75	91.50
	Exposed		90.00	88.25	83.00
Radish	Check	96.25	98.75	98.25	99.75
	Protected		99.25	98.75	98.50
	Exposed		97.25	99.50	99.75
Garden bean	Check	87.50	81.50	87.00	86.50
	Protected		73.50	78.00	78.50
	Exposed		76.25	84.50	83.00
Garden bean*	Check	86.00	75.00	85.00	81.50
	Protected		82.00	80.50	83.50
	Exposed		77.00	82.25	81.00
Sweet corn	Check	93.75	94.50	93.75	94.50
	Protected		94.00	94.50	97.00
	Exposed		93.25	93.50	94.75
Sweet corn*	Check	95.00	97.50	94.75	93.00
	Protected		96.25	95.75	95.25
	Exposed		94.50	95.25	96.50
Cucumber	Check	94.00	91.50	94.50	94.50
	Protected		92.00	91.75	94.75
	Exposed		95.00	93.00	92.00
Cucumber*	Check	95.75	92.25	94.75	92.50
	Protected		94.50	93.00	95.25
	Exposed		93.50	94.00	92.75

* Arasan treated.

Table 13

Monthly Temperature and Precipitation Figures for Blythe During the Period of Storage of the Packet Seed

Month	Temperature					Total precipitation, inches
	Averages			Extremes		
	Daily maximum °F	Daily minimum °F	Monthly °F	Highest °F	Lowest °F	
Aug., 1951	105.9	75.2	90.6	114	67	6.00
Sept., 1951	106.3	69.5	87.9	112	64	T
Oct., 1951	91.0	56.7	73.9	105	43	.50
Nov., 1951	75.5	45.6	60.6	86	37	.48
Dec., 1951	65.4	40.5	53.0	76	27	.20
Jan., 1952	65.6	37.0	51.3	78	24	.30
Feb., 1952	72.9	41.6	57.3	83	33	.02
Mar., 1952	73.5	45.7	59.6	90	35	1.29
April, 1952	86.8	55.1	71.0	99	48	.58
May, 1952	101.1	63.8	82.5	109	57	.00
June, 1952	101.9	66.3	84.1	112	60	.72
July, 1952	109.9	75.9	92.9	118	66	.12
Annual	88.0	56.1	72.1	118	24	10.21

Desert Region, Blythe, Riverside County. The climate at Blythe is typical of the desert regions of California. During the period of storage at Blythe the annual daily mean maximum and minimum temperatures were normal, the annual mean daily maximum being 88 degrees F. and the minimum 56.1 degrees F. The annual mean monthly temperature was 72.1 degrees F., with the extremes for this period at 118 degrees F. and 24 degrees F. The average 42-year record for precipitation is four inches. During the period of storage 10 inches of precipitation were recorded. Six fell during August 1951 in approximately three days. This was six inches over the yearly average. The relative humidity at Blythe is fairly low during the whole year. Table 13.

The protected series of packets were stored in the City of Blythe in a metal roofed warehouse on a shelf in a partitioned office, heated during the winter. The exposed series were stored at the California Border Inspection Station. The hardware cloth cage containing the packets was hung from the ceiling of a slat-like structure open on four sides. During periods of rain the seed was moved indoors. The packets were exposed to all outside climatic conditions except direct sunshine.

Table 14 shows at four month intervals the germination percentage of the seed packets. All seed stocks maintained vitality fairly well under the display conditions of very high temperature present at the location. The exposed series of carrot, lettuce and onion showed a small trend of falling viability on the final test. These seed stocks were still standard or above. The protected packet of untreated bean germinated a little low, due probably to variation within the lot of seed used for packeting. The protected untreated sweet corn was infested with larvae of the Buffalo carpet beetle (*Anthrenus* spp.) which caused the drop in germination.

Table 14

Germination Percentages at Four-month Intervals of Seed Stocks Stored at Blythe by the Agricultural Commissioner of Riverside County

		Initial germination 8-1-51	4 months 8-1-51 to 12-1-51	8 months 8-1-51 to 4-1-52	12 months 8-1-51 to 8-1-52
Tomato	Check	97.50	94.75	94.50	95.25
	Protected		94.00	94.50	92.50
	Exposed		95.00	92.25	90.75
Carrot	Check	89.25	84.25	88.00	87.00
	Protected		85.00	85.75	84.25
	Exposed		83.00	77.25	80.50
Lettuce	Check	93.00	89.00	89.50	89.75
	Protected		84.50	89.25	85.75
	Exposed		88.50	87.00	80.00
Onion	Check	91.00	94.75	94.75	92.75
	Protected		93.00	92.50	91.00
	Exposed		90.00	89.75	81.75
Table beet	Check	93.00	91.75	90.25	97.25
	Protected		92.00	86.25	92.75
	Exposed		95.00	89.00	92.00
Cabbage	Check	94.75	94.75	93.25	91.00
	Protected		88.50	93.25	90.75
	Exposed		91.75	89.75	86.75
Radish	Check	96.25	98.75	98.25	99.75
	Protected		98.25	98.75	98.50
	Exposed		98.00	97.75	97.00
Garden bean	Check	87.50	81.50	87.00	86.50
	Protected		76.25	81.25	77.25
	Exposed		81.00	84.00	80.00
Garden bean*	Check	86.00	75.00	85.00	81.50
	Protected		75.50	87.50	83.00
	Exposed		76.00	82.00	78.50
Sweet corn	Check	93.75	94.50	93.75	94.50
	Protected		93.75	88.50	73.50†
	Exposed		94.50	95.50	94.25
Sweet corn*	Check	95.00	97.50	94.75	93.00
	Protected		94.50	94.25	95.25
	Exposed		94.75	94.00	94.50
Cucumber	Check	94.00	91.50	94.50	94.50
	Protected		91.75	94.25	90.75
	Exposed		92.00	92.00	88.25
Cucumber*	Check	95.75	92.25	94.75	92.50
	Protected		94.25	92.25	90.75
	Exposed		91.25	93.00	92.25

* Arasan treated.
† Buffalo carpet beetle damage (*Anthrenus* spp.).

SUMMARY

Ten popular varieties of vegetable seed stocks were packeted and distributed to seven different locations in the State. The purpose was to study the effects that varying display conditions may have upon vegetable seed packets for sale at retail. Three identical stocks of seed were treated with an organic seed disinfectant, Arasan, at recommended dosages to note whether it affected the viability of the seed packets while awaiting sale. A check was maintained at the Federal-State Seed Laboratory, Sacramento. Two identical series of seed were stored at each location, one inside, protected, and the other series exposed outside when facilities were available for the full tenure of storage.

In general all seed packets and cartons stored indoors at each location maintained their viability very well, as compared to the checks. The exceptions were the cartons of untreated sweet corn stored at Fresno and Blythe. This drop in the rate of germination on the final test was due to damage caused by larvae of the carpet beetle (*Anthrenus* spp.)

The exposed series of packets lost some viability along the coast. This is true for those varieties considered short-lived. Carrot, lettuce and onion seed packets lost viability at Eureka and Watsonville but the replications at Los Angeles germinated well. The remainder of the vegetable packets stored in the coastal areas held up fairly well. The high prevailing humidity at Eureka decreases as one moves down the coast to Los Angeles. This is reflected by the increase in viability in the seed packet replications from north to south.

In the interior valley, the exposed series maintained good germination at Marysville, except the packets of carrot, lettuce, onion and cabbage which showed a small drop in viability. The lettuce seed was below standard, but applying tolerance brought it up. At Fresno a sudden rain shower caught the exposed series of packets before they could be removed inside. This rain occurred prior to the April 1st germination test. Comparison of the final tests in Tables 8 and 10 for exposed packets of carrot, garden bean both treated and untreated, and sweet corn untreated, shows the deleterious effects of moisture on seed.

At Alturas the exposed packets maintained a good quality of germination. Under conditions of high temperature and low humidity that prevail at Blythe the exposed packets of lettuce, onion and carrot showed a slight trend of falling germination.

It is evident from the tables that sensitive seeds lose the most viability in areas of high prevailing humidity, as at Eureka and Watsonville. At Blythe there is a combination of high temperature and low humidity with a slight trend of falling germination for the exposed packets of carrot, lettuce and onion seeds.

It does not appear that the Arasan treatment caused any deleterious effect to the germination qualities of seed awaiting test. To maintain the germination qualities of packet seeds the following would be helpful:

1. Use good seed stocks for packeting, that is, stocks free from light seed, insect damage, insect eggs or larvae, etc.
2. Protect packets as much as possible from high humidity and high temperature.

ORGANIZATION AND DUTIES OF THE CALIFORNIA DEPARTMENT OF AGRICULTURE

California's agricultural production, including more than 200 commercial crops, is the most diversified in the United States. There are at least 40 crops which return an annual income each of $2,000,000 or more.

In 1952, the cash farm income in California was $2,807,318,000, the highest ever recorded by any state in a single year. A combination of climate, soil, irrigation, mechanization, fertilization, insect and disease control, quality standards, research, marketing programs and facilities, crop specialization, transportation, advertising and promotion—all these factors and many others, including ingenuity and skill, result normally in California being rated the leading state in the Union in terms of annual cash receipts. In fact, cash receipts from marketings by California farmers since 1947 have been approximately $2,000,000,000 or more each year.

Cash receipts from the sale of crops alone far exceed those for any other state, but combined livestock and poultry enterprises also rank high as a source of farm income.

California growers produced the following percentages of the national crops in 1952: almonds, 100 percent; apricots, 89 percent; dried figs, 100 percent; grapes, 94 percent; lemons, 100 percent; oranges, 33 percent; olives, 100 percent; peaches, 48 percent; pears, 52 percent; prunes, 98 percent; English walnuts, 90 percent; asparagus, 53 percent; tomatoes, 51 percent; 21 of 27 major vegetables for the fresh market, 30 percent; dry edible beans, 25 percent; cotton, 12 percent; alfalfa, 11 percent; hops, 25 percent; rice, 24 percent; sugar beets, 26 percent.

DIVISION OF ADMINISTRATION

The State Director of Agriculture is appointed by, and serves at the Governor's pleasure. The deputy director is appointed by the director and is the only noncivil service employee in the regular service of the department.

Anson Alvin Brock was appointed Director of Agriculture, March 31, 1944. He had previously served six years as director, from February, 1933, to March, 1939. W. C. Jacobsen was appointed deputy director in 1953. Dr. Arthur G. Boyd was appointed assistant director in 1953 and is the department's chief civil service employee.

The department has three regional coordinators: Romain Young in Sacramento, Charles H. Kinsley in San Francisco, John B. Steinweden in Los Angeles.

The headquarters of the department is in Sacramento.

STATE BOARD OF AGRICULTURE

The State Board of Agriculture advises the Director of Agriculture on policy matters regarding the administration of California agricultural laws and related matters. The board meets each month, usually at Sacramento, to review current problems and situations facing the department and the state's agricultural industry.

The Governor appoints the members of the State Board of Agriculture. The members receive no salary but are allowed necessary expenses for attendance at official meetings. W. C. Jacobsen is assistant secretary of the board.

The present board consists of: A. J. McFadden, Santa Ana, president; Frank M. Shay, San Jose, vice president; James E. Armstrong, Los Angeles; Donald C. Bull, Marysville; W. L. Smith, Buttonwillow; John V. Newman, Ventura; Louis Rozzoni, Clements; Dr. Harry Wellman, vice president, Agricultural Sciences, University of California, Berkeley; Milton M. Reiman, Planada.

OFFICE OF ADMINISTRATION

The State Director of Agriculture directs the California Department of Agriculture and administers the Office of Administration, including the regional coordinators, the personnel officer, and the fiscal officer. His immediate assistants are the deputy director and the assistant director.

The Office of Administration provides agricultural and economic information to the Governor and the Legislature; administers cooperative relations with federal, state and county agencies and institutions, and is responsible for direction of the Bureau of Accounts and Disbursements and the departmental accounting work.

The Office of Administration issues the publication known as the State Department of Agriculture Bulletin. Through the personnel office, it administers the personnel program for the department and maintains a roster of employees for pay roll purposes, leave and retirement.

Of approximately 185 state civil service job classifications used in the department, over 140 apply to the Department of Agriculture alone. The personnel office conducts job classification studies and salary surveys and investigates cases requiring disciplinary action.

In cooperation with and for the counties of the State, the personnel office examines applicants and certifies those who pass to positions as County Agricultural Commissioners, Deputy Agricultural Commissioners, County Sealers of Weights and Measures, Deputy Sealers of Weights and Measures, County Agricultural Inspectors, and Seasonal Agricultural Inspectors.

It administers all fiscal matters of the department relating to budgets, accounts, collections, pay rolls, and disbursements.

The basic guides for administration of the California Department of Agriculture are the Agricultural Code, Divisions 5 and 8 of the Business and Professions Code, and the California Administrative Code.

It is also the duty of the Office of Administration to keep the public informed of the work of the State Department of Agriculture. This is accomplished through public statements, motion pictures, radio broadcasts, telecasts and the Department of Agriculture Bulletin.

An agricultural library is maintained at the Sacramento headquarters of the department.

DIVISION OF PLANT INDUSTRY

CHAS. V. DICK, Chief

The Division of Plant Industry includes the Bureaus of Entomology, Plant Quarantine, Plant Pathology, Rodent and Weed Control and Seed Inspection, Field Crops, and Chemistry.

BUREAU OF ENTOMOLOGY

H. M. ARMITAGE, Chief; ROBERT W. HARPER, Assistant Chief

This bureau conducts surveys for new insect pest infestations, and develops procedures for eliminating or controlling such pests in cooperation with the agricultural commissioners, the College of Agriculture of the University of California, and the United States Department of Agriculture; engages in the eradication of incipient infestations of new and serious insect pests, where deemed practical, and in the control of major insect pests of state-wide distribution not amenable to grower or industry effort.

The bureau renders advisory assistance to the county agricultural commissioners in meeting local insect pest control problems and in keeping them currently informed in the field of pest control materials and procedures.

An important function is the identification and classification of insect pests intercepted during quarantine inspections or insect pest surveys. For that purpose the bureau maintains a taxonomic entomological service at Sacramento.

This bureau administers the state apiary inspection laws in cooperation with the agricultural commissioners and the apiary inspectors. The apiary laws protect the State's extensive honey, queen and package bee industry from the spread of infectious diseases.

BUREAU OF PLANT QUARANTINE

A. P. MESSENGER, Chief

The Bureau of Plant Quarantine administers and enforces interstate and intrastate quarantines against hosts and possible carriers of injurious domestic and foreign insects, pest animals, weeds, and plant diseases, directly or in cooperation with the United States Department of Agriculture and the agricultural commissioners.

Agricultural inspection stations are maintained by this bureau on all of the principal highways entering the State and at the principal maritime ports. Inspection activities are also carried on at airports, military and naval establishments and at common carrier depots within the various counties by the agricultural commissioners and their staffs.

Cooperating with the department and the commissioners in this enforcement activity are postmasters, express companies, air line and railroad officials, and others.

Were there not formidable natural barriers to, or restrictions upon the admission of agricultural pests not presently established in this State, inestimable damage could result to California agriculture.

Nursery Service coordinates the nursery inspection program to insure uniformity of inspection procedures in all counties. Nursery stock where grown or sold is inspected periodically for plant pests by county agricultural commissioners. One of the principal objectives of the inspection is to prevent the establishment of new or uncommon pests in nurseries. Such pests when found on nursery stock are required to be eradicated. Other pests of more general distribution are required to be effectively controlled. County agricultural commissioners have joined in an agreement whereby nurseries meeting specified plant pest requirements are issued a special intercounty nursery stock certificate and may ship their stock to 54 of the 58 counties without inspection at destination. An important part of the work is training county inspectors in the detection and control of insects, nematodes, diseases and weeds that may be found in nursery stock.

Several voluntary programs for plant growers are conducted by Nursery Service. The citrus tree registry program provides for the inspection of citrus budwood sources and the registration of trees found free of symptoms of psorosis, the scaly bark disease. A list of citrus trees registered is published. Strawberry plant beds located in properly isolated areas are inspected and planting stock produced may be certified as being true to variety and relatively free from virus diseases and other pests. In addition strawberry plants indexed and found free from virus may be approved as registered foundation stock. A service for the identification of parent fruit and nut trees used for root and top stock sources is also maintained.

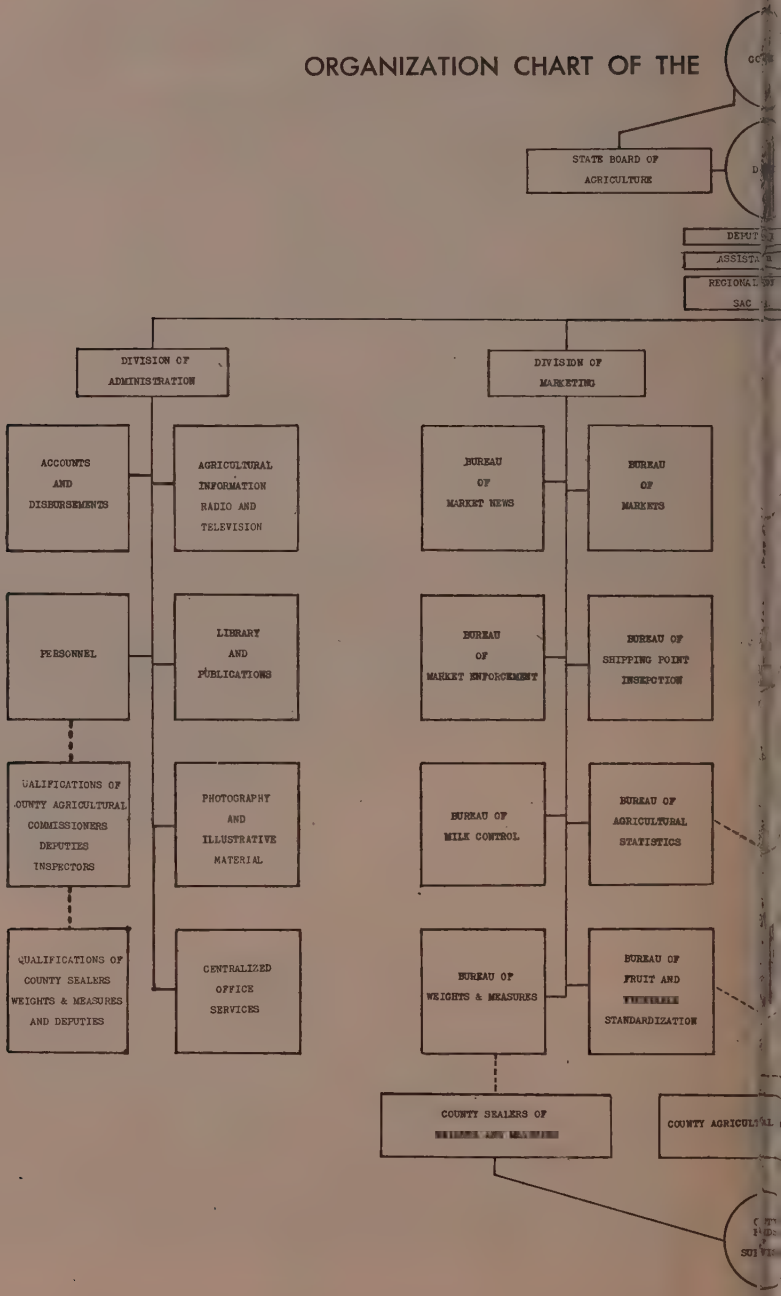
In addition Nursery Service licenses the sale of nursery stock; publishes a directory of nurserymen and nursery locations; publishes an annual census of fruit and nut trees and vines on hand in California nurseries; and enforces nursery stock grades and standards. Fees collected for licenses and the several voluntary programs pay for the work of the service.

Wray F. Hiltabrand is Supervisor of Nursery Service.

BUREAU OF PLANT PATHOLOGY

GILBERT L. SCOTT, Chief; GEORGE E. ALTSTATT, Assistant Chief

Plant pathology is concerned with diseases of plants as distinguished from insect pests. The work of the bureau is in the applied and economic phases of plant pathology with particular reference to regulatory work under the Agricultural Code of California. It is concerned primarily with the infectious plant diseases such as those caused by bacteria, fungi, viruses, plant parasitic nematodes, and other plant pathogens. It includes the prevention of the introduction and spread of new diseases, their detection when they become introduced, and their suppression and eradication when incipient outbreaks occur.


ORGANIZATION CHART OF THE
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DIVISION OF ADMINISTRATION
DIVISION OF MARKETING
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AGRICULTURAL INFORMATION RADIO AND TELEVISION
BUREAU OF MARKET NEWS
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BUREAU OF SHIPPING POINT INSPECTION
QUALIFICATIONS OF COUNTY AGRICULTURAL COMMISSIONERS DEPUTIES INSPECTORS
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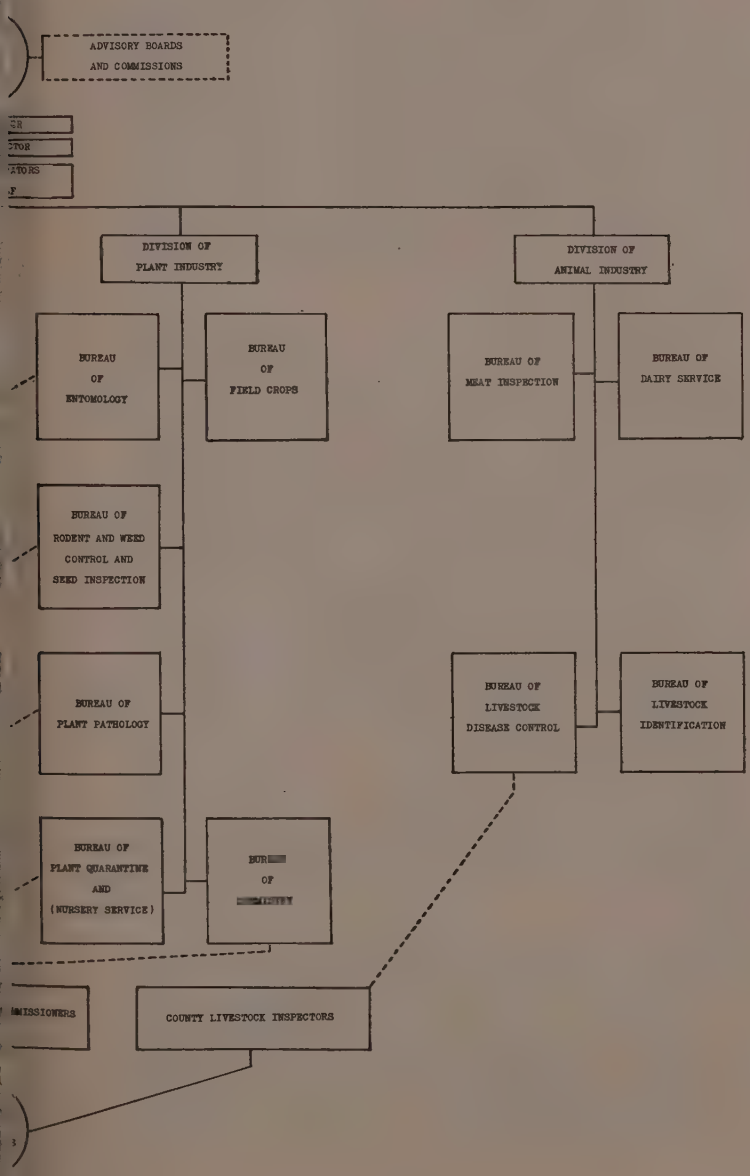
CALIFORNIA DEPARTMENT OF AGRICULTURE



A chief function of the bureau is to extend technical aid, including advice and information, to the County Agricultural Commissioners and to other bureaus in the department. Diagnostic laboratories are maintained in Sacramento and in Southern California and plant pathologists are available for consultation with these agencies.

Leadership and coordination, as well as technical service, is supplied in cooperative work with the counties. Field surveys are conducted in cooperation with the latter to determine the distribution of plant diseases present but not yet widely distributed in the State so that information can be supplied to the Bureau of Plant Quarantine for establishment of quarantine lines. The bureau also maintains a cooperative working relationship with the United States Department of Agriculture in survey, suppression, and eradication projects for specific diseases. Through arrangements with the Federal Department of Agriculture, post-entry inspections are made during a quarantine detention period of plants and materials imported from foreign countries to detect diseases which might be introduced.

Technical assistance is given to the Bureau of Plant Quarantine and its Nursery Service personnel in the operation of a strawberry plant certification program and in various plant disease problems in connection with nurseries and quarantine. Assistance is given to the Bureau of Fruit and Vegetable Standardization in its seed potato certification work and to other bureaus in various problems involving plant diseases.

Particular attention is given to the detection and suppression of new diseases, including those known only outside of California but which might have eluded quarantine and inspection barriers. A permanent survey staff works with the county agricultural commissioners in surveys and inspections to detect such diseases. Also, the Agricultural Code requires that all employees of agencies and institutions supported and financed by public funds must report the presence of new diseases. When they are discovered, particularly in incipient stages, suppressive and eradicative measures are initiated. In the absence of needed information normally supplied by research agencies, suitable measures are devised according to the exigency of the case.

Fundamental research in plant pathology is not a function of the bureau, but up-to-date knowledge of the results of research is highly essential to its activities. The bureau works in close cooperation with various research agencies, including those in the University of California, United States Department of Agriculture, experiment stations of other states, industry, and with other countries, in order to keep currently abreast of new methods and developments in plant disease prevention and suppression.

BUREAU OF RODENT AND WEED CONTROL AND SEED INSPECTION

WALTER S. BALL, Chief

The work of this bureau is based upon the necessity of protecting California's crops against depredations by injurious rodents and birds, and from noxious weeds. It also inspects and tests seed for farm planting and is responsible for enforcement of the "California Seed Law," which requires the correct labeling of agricultural seed.

In cooperation with county agricultural commissioners, the bureau administers programs relating to control of ground squirrels and other rodents, predatory animals, and field rodents harboring diseases transmissible to humans.

It endeavors to keep staff officers and the county workers informed regarding new rodenticides and herbicides developed through modern research for the best methods in rodent and weed control. It assists in the development of weed control programs, devises weed control procedures and cooperates with county boards of supervisors, agricultural commissioners and landowners in directing weed control programs.

Specialized projects involving weed eradication or suppression of field rodents on account of diseases transmissible to humans are carried on in the counties under agreements between the department and the county boards of supervisors.

Important services of the Bureau of Rodent and Weed Control and Seed Inspection are the identification and botanical classification, upon request, of plant specimens as well as investigations and surveys for poisonous plants.

The bureau cooperates with the Joint Wild Life Management Committee to encourage establishment of feeding places for ducks and geese to lessen destruction of crops. It also cooperates in the control of certain species of predatory and non-game birds when they are damaging crops.

Demand for work against predatory animals continues to be intensive. Economic losses represent considerably greater values than in years past, and livestock men are now more predator-control conscious. This work is designed to head off increasing losses to livestock and other agricultural crops.

Close cooperation is maintained with the U. S. Fish and Wildlife Service, the U. S. Forest Service, the California Department of Public Health, the California Department of Fish and Game, the University of California, the California Crop Improvement Association, the Association of Official Seed Analysts of North America, the Western Weed Control Conference, the county agricultural commissioners, farm advisers, county boards of supervisors, seedsmen, and individual ranch owners.

BUREAU OF FIELD CROPS

V. O. Wolcott, Chief; W. L. Hunter, Assistant Chief

The activities of the bureau are divided into four groups and cover both regulatory and service functions dealing with the inspection of field crop products, the manufacture and sale of all commercial feeding stuffs, the warehousing of agricultural products under bond, and the storing of grain in public grain warehouses.

Administrative costs of all functions are met through license fees on warehouses, feed dealers, manufacturers, and through the tonnage tax on commercial feeding stuffs. All activities are special fund or self-supporting functions.

Under the field crops inspection provisions, employees of the bureau are licensed by the United States Department of Agriculture. All field crop products, including hay, beans, peas, rough and milled rice, hops, flaxseed, all grains, and grain sorghums, are inspected and graded under United States standards.

Laboratories are maintained for the inspection of field crop products in Sacramento, Los Angeles, San Francisco, Petaluma, Stockton, and Vallejo, with a seasonal branch laboratory in Imperial, Imperial County, during the flaxseed and grain harvest. There is also a branch office maintained at Santa Rosa during the hop-picking season to handle the sampling of baled hops in that area.

The commercial feeding stuffs provisions require the licensing of all concerns selling, manufacturing, or distributing such material, the proper labeling of and the payment of a tonnage tax of 4 cents on each ton sold, offered or exposed for sale to the consumer-buyer.

The public grain warehouse inspection provisions, commonly referred to as the "weevil act," apply only to warehouses storing grain for the public and do not cover private grain storage facilities. These provisions are primarily for the control of insect infestation in public grain warehouses.

The agricultural (bonded) warehouse provisions, which are optional, provide for the licensing and bonding of warehouses storing agricultural products. These provisions require the warehouseman to file with the Department of Agriculture a surety bond guaranteeing the obligations assumed by him, and to comply with other requirements of this section of the code and the regulations thereto.

BUREAU OF CHEMISTRY

ALLEN B. LEMMON, Chief; R. Z. ROLLINS, Assistant Chief

The Bureau of Chemistry administers provisions of the Agricultural Code and pertinent regulations with regard to registration, labeling, sale, commercial application, and use of agricultural chemicals.

Commercial fertilizers, agricultural minerals, and auxiliary plant chemicals are registered, and their labeling and advertising are examined to assure informative labeling and to prohibit misrepresentation. These fertilizing materials are sampled and analyzed to compare their composition with their guaranteed analyses. Similar control is exercised over soil amendments and manures although registration of these fertilizing materials is not required. A free annual publication is available showing results of the examination and analyses of approximately 2,500 samples of fertilizing materials and including statistics on tonnages of materials sold and related information. Fertilizer salesmen are licensed.

Economic poisons, now more commonly called pesticides, are registered. These include insecticides, fungicides, herbicides, rodenticides, defoliants, vermicides, wood preservers, and similar materials for control of pests. Proposed composition, use, and labeling of products submitted for registration are examined to prevent sale of ineffective, unsuitable, or dangerous products. Approximately 2,000 samples are drawn each year from materials found offered for sale and analyzed to check conformity of composition with guaranteed analysis. Some products are bioassayed with insects to determine their pesticidal efficacy. Another free annual publication is available showing results of analyses and examinations of these official samples and including other pertinent information.

Fruits and vegetables, as well as hays and fodders, are sampled and analyzed to determine whether they contain deleterious spray residues in excess of tolerances prescribed in the Agricultural Code.

Agricultural pest control operators are licensed for the specific types of pest control for which they are qualified and certificates of qualification are issued to pilots of aircraft used in the business of agricultural pest control. Regulations governing these operators and pilots and their operations are administered jointly with the county agricultural commissioners. Statistical information on agricultural aircraft operations is included in this bureau's annual report.

Regulations pertaining to the use of injurious pesticides such as 2,4-D, arsenical dusts, and parathion are also jointly administered with the county agricultural commissioners.

Chemical and bioassay laboratories for examination of official samples are maintained in Sacramento, and laboratories for spray residue determinations are also maintained at San Francisco, Los Angeles, and San Diego. A field laboratory for analysis of official samples of agricultural gypsum is maintained at Bakersfield. Miscellaneous analytical services are provided for county agricultural commissioners and other state and county officials, but not for individuals.

Reports of damage or injury attributed to agricultural chemicals are investigated to determine if a violation of law is involved in the composition of the material used, the circumstances surrounding its labeling or sale, or those in its commercial application. Knowledge of all circumstances surrounding the accident also serves as a basis for precautionary labeling and handling of agricultural chemicals.

DIVISION OF MARKETING

C. J. Carey, Chief

The Division of Marketing includes the Bureaus of Markets, Market Enforcement, Milk Control, Market News, Agricultural Statistics, Fruit and Vegetable Standardization, Shipping Point Inspection and Weights and Measures.

BUREAU OF MARKETS

W. J. Kuhrt, Chief; E. W. Braun, Associate Chief

The work of this bureau is divided into three general categories, namely, General Marketing Service, administration and enforcement of the several marketing control laws, and the handling of marketing surveys in cooperation with the Federal Marketing Act of 1946. General Marketing Service includes marketing assistance to groups of farmers and handlers of farm produce in the solution of their agricultural marketing problems and also includes assistance to farm groups in cooperative organization.

The principal activities of this bureau have to do with the administration and enforcement of agricultural marketing control laws.

These include the California Marketing Act of 1937, the Agricultural Producers Marketing Act and the California Agricultural Products Marketing Act. These acts differ somewhat in their scope of activity and in the procedures to be followed. The California Marketing Act authorizes the Director of Agriculture to issue and make effective marketing orders and marketing agreements containing regulations applicable upon either producers or handlers or both. The Agricultural Producers Marketing Act authorizes the issuance of marketing programs containing regulations directly applicable upon producers only. The California Agricul-

tural Products Marketing Act authorizes the issuance of marketing orders containing regulations applicable upon handlers only, but this act may be used only upon those commodities for which there is a similar federal marketing order in effect.

The types of marketing regulations authorized under these three acts are similar, the California Marketing Act and the Agricultural Producers Marketing Act containing approximately the same scope of regulation and the California Agricultural Products Marketing Act containing a narrower scope of authorized regulations omitting particularly authority for advertising and trade promotion. For the purpose of brevity, the authorized types of regulation in the California Marketing Act are outlined as:

a. Control of surplus by means of volume, grade or size restrictions with provisions for the establishment of surplus, stabilization, diversion or substandard pools, or by means of the purchase and diversion of surpluses with stabilization fund moneys collected or received for such purposes.

b. Establishment of the period during which an agricultural commodity can be processed by processors.

c. Regulation of the periodic movement to market of an agricultural commodity in order to maintain a more even flow to market.

d. Establishment of grade, size, quality or condition specifications and provision for the inspection and certification of all of the commodity in accordance with such specifications.

e. Establishment of plans for advertising and trade promotion including plans to prevent, modify or eliminate trade barriers.

f. Provisions designed to prevent unfair marketing and trade practices.

g. Plans for carrying on necessary research in the production, processing and distribution of agricultural commodities.

h. Provisions for carrying on tree or vine removal programs and for making payments to producers in connection with such programs.

Marketing orders and programs under state laws originate upon request of grower or handler groups or both. The Bureau of Markets assists these groups in the drafting of an acceptable form of the marketing order and conducts a public hearing in accordance with the provisions of the law. Before becoming effective all such marketing orders and programs are submitted to the producers and handlers affected for their assent, and no marketing order or program is made effective unless the assent as required by law has been received by the department.

All marketing orders and programs provide for the appointment by the Director of Agriculture of advisory boards composed of producers or handlers or both. These advisory boards administer the marketing orders in each case, subject to the approval of the Director of Agriculture.

All marketing orders also provide for the levying and collection of an assessment rate or rates to provide funds to defray the costs of administration and also to provide any funds required for advertising and trade promotion and research programs as may be contemplated.

The provisions of marketing orders and programs including the collection of assessments are enforceable by law, and violators may be subjected to the penalties prescribed in these acts. Enforcement procedures

are handled by the Bureau of Markets and any litigation thereunder is handled by the Attorney General of the State.

The third phase of the work of the bureau is that of carrying on surveys of the marketing and distribution problems of the various agricultural industries of the State for the purpose of developing new and larger markets and expanding the sales of the various agricultural products produced in this State. These surveys are carried on by the bureau in cooperation with various other state agencies and with funds jointly furnished by the California State Legislature and from appropriations granted to the State Department of Agriculture by the Federal Government under the Marketing Act of 1946.

The Bureau of Markets is limiting its marketing surveys generally to those commodities for which there are marketing orders in effect and because of our limited staff, first attention is being given to those industries which are undertaking to correct a surplus supply condition.

BUREAU OF MARKET ENFORCEMENT

J. C. HARLAN, Chief; H. S. CANN, Assistant Chief

This bureau is responsible for the enforcement of the Produce Dealers Act and the Processors Law, appearing as Chapters 6 and 9 of Division 6 of the Agricultural Code. These laws are regulatory measures and provide protection for producers of farm products by requiring that those persons who deal in such products be licensed, and that they adhere to a strict code of fair practices set forth in the several statutes. Licensees are required to make prompt payment for farm products purchased, and must make full and fair accounting and true returns for all products handled on a consignment basis.

The Produce Dealers Act requires that all persons who deal in farm products in fresh form for distribution through wholesale channels be licensed as dealer, commission merchant, broker, or cash buyer. Dealers are required to post a one thousand dollar ($1,000) surety bond with the bureau as security for producer-creditors; commission merchants post a five thousand dollar ($5,000) bond as security for the proceeds of sales of consignments. Bonds are not required from brokers or cash buyers. Cash buyers must pay for farm products in cash in full, at time of taking delivery or control, in lawful money of the United States, coin or currency.

The Processors Law provides that all processors who purchase farm products from producers for resale in processed form must obtain a processor's license and post a five thousand dollar ($5,000) bond as security for producer-creditors, unless purchases are made strictly on a cash basis—lawful money of the United States, coin or currency, in full at time of taking delivery or control.

All persons who represent licensed principals in soliciting or contracting farm products from producers must secure agents' licenses.

The work of the bureau is largely in the field, and involves investigations of complaints filed by producers against licensees, as well as constant and continuing supervision of agricultural centers and shipping points for the purpose of insuring that all handlers of farm products be properly licensed and bonded.

The number of licenses issued by the bureau in 1952 was 13,464, comprised of 7,846 principal licenses and 5,618 agents' licenses.

As a result of action by the bureau in 1952, a total of $534,886.61 was recovered for 1,028 producers of farm products. During this period 126 formal hearings involving controversy between producers and handlers were held by officers of the bureau. License revocations totaled 20; four licenses were suspended, and nine applications for licenses denied.

Headquarters office of the bureau is in Sacramento. Branch offices are at Agricultural Building, Embarcadero at Mission Street, San Francisco; 402 Rowell Building, Fresno, and 900 Mirror Building, Los Angeles.

The services of the bureau may be obtained by contacting any of these offices by letter, telephone, or by calling in person. There are no charges for investigation, hearing, or for securing recoveries or adjustments for growers.

BUREAU OF MARKET NEWS

GEORGE K. YORK, Chief; WALTER J. ENGLUND, Assistant Chief

Under the terms of a cooperative agreement with the United States Department of Agriculture, this bureau operates as the Federal-State Market News Service. For over 25 years it has been recognized that such a contract was a means of combining the facilities of the Federal and State Departments of Agriculture, enabling both to do a more effective and complete job of assembling and disseminating Market News information.

This agency reports on the marketing of agricultural commodities for sale in local, interstate and foreign markets; its reports contain data on prices, market conditions, demand, supply, carlot movements, cold storage holdings and other related information.

A federal leased wire teletype system of approximately 11,000 miles keeps California in constant daily nation-wide touch with all important terminal markets and with most of the shipping point markets located in important producing areas. Interoffice communication within California is maintained by a radiotelegraph network. This is used primarily for rapid transmission in California of market information from other states and for centralizing California market information for transmission to eastern markets.

Daily market information released by this agency is disseminated by mail, radiobroadcasting stations, the press, press wire services and telephone. Over 60 radio stations in California broadcast the information to all sections of the State within a few hours after prices are established. Most newspapers publish the data in their market or financial pages. The mimeographed reports of the service are mailed free upon request.

Terminal Market News offices at San Francisco and Los Angeles issue daily and other periodic reports on fresh fruits and vegetables; livestock, meat and wool; dairy and poultry products; and hay, grain and feeds. Along with fruits and vegetables, the San Francisco office issues special reports on bulk wine prices and the Los Angeles office on citrus marketing and distribution.

A livestock office at Stockton serving both a terminal and field office function, reports the sale of livestock at the Stockton yards, auction

sales at Visalia, and contract and direct sales throughout the central valley.

The Sacramento office is administrative headquarters and in addition acts both as a field office for fresh fruits and vegetables, dried fruit, honey, alfalfa hay and other miscellaneous field crops, and as a clearing house for all types of marketing information. Among the reports issued from Sacramento are foreign reports on various fruits and nuts competing with California production.

Field offices are located in important producing areas. The shipping point office at Salinas issues year-round reports on vegetables, particularly lettuce and carrots. Santa Maria, also a year-round shipping point market office, issues reports on cauliflower, broccoli, celery, lettuce and other vegetables.

The Brawley shipping point market office operates from November through early July for Imperial Valley lettuce, carrots, other vegetables, watermelons, cantaloups, other melons and grapes. The Lodi shipping point Market News office operates from mid-August to mid-November, reporting the marketing of Tokay grapes.

The shipping point market office at Bakersfield issues daily reports on early potatoes, onions, early grapes, deciduous fruits and various vegetables.

Two field offices are located at Fresno. The fruit and vegetable office issues daily reports on grapes, deciduous fruits, cantaloups, other melons, tomatoes and other vegetables. The dairy and poultry office in addition to covering grower and processor prices of these products in general, is particularly important as a source of turkey market news to the industry nation-wide.

Year-round reporting of bulk wine prices and seasonal reporting of winery prices to growers and the wine crush is headquartered at San Francisco and assisted by offices at Sacramento, Lodi, Fresno, Bakersfield and Los Angeles.

BUREAU OF MILK CONTROL

D. A. Weinland, Chief; W. J. Hunt, Jr., Assistant Chief

This bureau administers and enforces the California Milk Control Act; Marketing of Milk and Other Dairy Products, which statute regulates the ice cream industry; Dairy Produce Exchange Act; and the California Dairy Industry Advisory Board Act.

The Milk Control Act provides a comprehensive plan for regulation of the California market milk industry to insure an adequate supply of pure and wholesome milk at fair and reasonable prices.

The statute requires the director to fix the minimum prices which distributors shall pay producers for their milk, and the minimum retail and wholesale prices at which distributors shall sell their product.

Activities of the bureau fall under two general classifications: minimum price fixing, and enforcement.

Producer prices and minimum retail and minimum wholesale prices for fluid milk are established by the director for the various marketing areas within the State. The prices fixed are based upon actual costs of production and distribution as determined by surveys and audits of representative producers and distributors operating within the areas for which the prices are being fixed. After the preliminary studies are

made by the department, public hearings are required to be held. After these legal requirements are met, the prices fixed by the director are enforceable by law.

Areas are established only after request from the industry. As the State is divided into 37 marketing areas, different prices occur, based upon the varying costs of production and distribution in the various areas.

The act relating to the marketing of milk and other dairy products sets up a method to regulate the fair trade practices of persons or firms dealing in dairy products. The statute makes unlawful the payment or allowances of secret rebates and giving dairy products, services, or money to secure or retain the business of a customer. It requires ice cream dealers to charge rentals for refrigeration facilities furnished to their customers, and further requires the department to conduct regular audits of their business activities.

Dairy produce exchanges, organized to furnish a medium for trading in butter, cheese, and eggs, are regulated by the bureau. Each exchange must secure a license from the director, as well as approval of its constitution, by-laws, rules and regulations, and basis of trade under which it proposes to operate.

CALIFORNIA DAIRY INDUSTRY ADVISORY BOARD

WILSON B. WOODBURN, Manager, Sacramento

The Bureau of Milk Control cooperates in administration of the California Dairy Industry Advisory Board Act authorized at the 1945 Session of the State Legislature. The work of the board is financed by an industry-approved levy on the production of butterfat in two months of each year.

The board is made up of four market milk producers, four manufacturing milk producers, three producer-handlers, and eight handlers of dairy products. It is the organization through which the director may conduct one or more campaigns of research, advertising, publicity, and education to increase consumption of dairy products and to gather and disseminate scientific information showing the importance of the use of milk, cream, and other dairy products in relation to public health, economy and diet, and proper nutrition of children and adults.

The research designed to increase the commercial use of milk or its derivatives, as well as to determine more specifically the protective value of milk as human and animal food, is conducted by the College of Agriculture, University of California.

The publicity and advertising campaigns are designed to bring to the adult population of California facts which made milk an important food. In addition, the efforts are calculated to show the economy of expending more in purchasing such protective foods as milk and other dairy products.

The educational program of the board is carried on in cooperation with the public and private schools of California.

The Manager of the Dairy Industry Advisory Board directs the work under supervision of the Director of the State Department of Agriculture and the Chief of the Bureau of Milk Control.

BUREAU OF AGRICULTURAL STATISTICS

G. A. Scott, Chief, R. E. Blair, Assistant Chief

This bureau, more generally known as the California Cooperative Crop and Livestock Reporting Service, operates under a cooperative agreement between the United States Department of Agriculture and the California Department of Agriculture, and is supported jointly by funds from both departments.

The bureau functions as a field unit of the United States Bureau of Agricultural Economics and as a bureau of the State Department of Agriculture. It develops the records and estimates of California agriculture for the federal department, which are correlated with similar data from other states, furnishing a systematic statistical record of the Nation's agriculture. This cooperative relationship makes possible a more thorough statistical coverage of the State's agriculture. It results in maximum use of statistical information developed by other bureaus, and makes statistical services readily available to them, to the public, and particularly to growers.

The primary function of this bureau is to develop, prepare and publish estimates of the acreage, production and value of all major crops of the State; of the number and value of the principal species of livestock and poultry; and of the quantity and value of livestock products.

In general, production forecasts are made for all major fruit, vegetable and field crops during the growing season, followed by estimates of production and value. These are checked wherever possible by records of disposition and utilization. Numbers of livestock and poultry are estimated annually, as are items of production and value of the principal livestock and livestock products.

The bureau also maintains year-by-year records of the acreages of all major fruit and nut trees, and of vines. This function is performed through cooperative effort between the bureau and the county agricultural commissioners, most of the field survey work being done by the latter group. The records show for each county details by kinds of fruits and nuts, by major varieties and by age groups. Reports containing these data are published annually.

In cooperation with the Bureau of Field Crops, quarterly reports are made covering stocks of various grains in warehouses, elevators, and mills. Corresponding estimates are made of farm stocks of grain. Similarly, monthly rice stocks reports are made.

Comprehensive records are kept covering the monthly receipts of milk and cream by all handlers, as well as dairy products manufactured, and related information. Both monthly and annual reports containing this information are published. This work is done on a cooperative basis between the Bureaus of Milk Control, Dairy Service, and Agricultural Statistics. Similarly, a working arrangement with the Supervising Apiary Entomologist results in a single set of official estimates of honey and wax production for California.

Since the latter part of 1952, the bureau has published weekly reports of the number of chicks hatched in the State, segregated between heavy and light breed types, and the number of chicks placed each week in broiler and fryer establishments.

The bureau also engages in certain research projects to test new sampling and estimating methods, and at the same time to render requested service to commodity groups in the State. Such work has normally been accomplished through the use of funds made available by industry groups under state marketing orders, and by federal-state funds under the National Research and Marketing Act of 1946. The Giannini Foundation of Agricultural Economics of the University of California cooperates with the bureau in such research work.

Many monthly, periodic and annual reports are prepared and published during the year, and are distributed to producers and to others without charge, upon request. To a large degree, the service is dependent upon the continued unselfish cooperation of thousands of farmers and stockmen who report directly to this office, and upon information given and records made available by many other individuals and concerns identified with the State's agricultural industry.

BUREAU OF FRUIT AND VEGETABLE STANDARDIZATION

H. W. Poulsen, Chief; S. R. Whipple, Assistant Chief

The Bureau of Fruit and Vegetable Standardization administers the following provisions of the Agricultural Code:

1. Fruit and vegetables standards, relating to quality, maturity, and pack, also to marking requirements applying to 35 fruits, nuts and vegetables. These provisions also prohibit deception and mislabeling in packaging.

2. Egg standards, relating to grades of size and quality which must be marked on containers offered at retail; also prohibits the sale of inedibles.

3. Honey standards, preventing sale of honey unfit for consumption, and requiring that honey containers be marked with U. S. grade designations.

Agricultural commissioners in the various counties enforce these sections of the code under supervision of bureau representatives. The bureau's own inspectors enforce them at highway stations in the State and supervise inspection at border stations where the work is done by quarantine inspectors.

4. Canning tomato standards, relating to compulsory inspection and certification of all loads delivered to canneries. It is unlawful to deliver or accept delivery unless the tomatoes comply with standards of quality and maturity, and are so certified. Bureau representatives, aided by a large staff of temporary inspectors, are directly in charge of this program.

5. Certified seed potato provisions relating to inspection of fields entered for certification and the resultant crop for freedom from injurious virus, bacterial and fungus diseases. This service, to insure good performance in the production of commercial crops, is supported by fees from growers and is administered directly by the bureau.

Seed potato test plots are maintained in the Half Moon Bay area in the spring to test the seed sources planted by growers for certification in a given year. Plots are also grown near Oceanside in the winter months to determine the presence or absence of diseases in the crop of seed grown

under certification procedure during the previous growing season of a given year. The Half Moon Bay plots are financed from the regular certification fees and the Oceanside plots from special fees.

BUREAU OF SHIPPING POINT INSPECTION

W. F. Allewelt, Chief; H. W. Peterson, Assistant Chief

This bureau cooperates with the United States Department of Agriculture in conducting the California Federal-State Inspection Service, inspecting and certifying the condition or grade of fruits and vegetables throughout the State.

Since its inception in 1920 this work has been on a self-supporting financial basis, and has been an optional service with no regulatory powers or duties. Any one having a financial interest in any lot of fruits or vegetables may request and receive inspection.

The work consists of careful examination of fruits and vegetables, usually as they are being graded, packed and loaded for shipment. Advice and assistance are given the grower and packer in connection with harvesting, handling, grading, sizing and packing operations, in order that they may meet any desired standard of grade, size and pack.

Certificates issued upon completion of the inspection describe in detail the quality, condition, size, grade, and pack of the products inspected and are admissible by law as prima facie evidence in all California and federal courts. The inspection certificates are used largely as the basis of sales f.o.b. at shipping points, in the settlement of claims, and as evidence in cases arising under the Federal Perishable Agricultural Commodities Act and California marketing programs.

Twelve branch offices are maintained the year around. Other seasonal offices operate for periods ranging from a few weeks to 8 or 10 months. Thirty branch offices were operated during 1952 under the direct supervision and management of experienced men designated as inspectors-in-charge.

BUREAU OF WEIGHTS AND MEASURES

J. E. Brenton, Chief; Burris G. Wood, Assistant Chief

The Bureau of Weights and Measures has jurisdiction over those sections of the Business and Professions Code applicable to weights and measures, and petroleum. Most of the work in the field is accomplished by the county sealers of weights and measures.

The bureau maintains branch offices at South Gate, San Diego, San Francisco and Fresno. These branch offices are concerned with the enforcement of the petroleum provisions of the law.

Any person in California who has a complaint regarding violation of the Weights and Measures Law should first report to the sealer of the county in which he resides. If the complainant does not know the address of the local county sealer, a memorandum setting forth the facts may be mailed directly to the Chief of the Bureau of Weights and Measures, State Department of Agriculture, in Sacramento.

Every article or commodity (with the exception of those sold by public utilities) sold by weight, measure or count, is subject to quantity inspection by this bureau. All sales of gasoline and motor oil, retail and wholesale, are subject to inspection, from the standpoint of volume and quality.

In addition to the jurisdiction and enforcement authority given to this bureau by the Legislature, it also has the authority to adopt and enforce tolerances and specifications for commercial weighing and measuring apparatus used in this State, similar to those recommended by the National Bureau of Standards. Such tolerances and specifications have been drawn up and adopted and are part of Title 4 of the California Administrative Code.

These tolerances and specifications cover the following devices and articles:

- Liquid measuring devices (pumps, etc.)
- Vehicle tanks (with meters and without meters)
- Grease-measuring devices
- Lubricating oil bottles
- Liquid capacity measures
- Milk bottles
- Glass graduates
- Scales:
  - Large capacity
  - Small capacity
  - Spring
  - Computing
  - Cream test and butterfat
  - Person weighers
  - Wheel-load weighers
- Weights
- Fabric measuring devices
- Linear measure
- Berry baskets or boxes
- Wood (measurements by cord)
- Farm holding tanks
- Liquefied petroleum gas

The bureau also enforces specific regulations applicable to potatoes in sacks and in lugs, mill products, apple boxes, coal and charcoal in sacks, butter, codfish, onions and peas.

All scales used for any commercial purpose are under the supervision of this bureau as to accuracy and structural specifications.

All measuring devices, including retail motor fuel pumps and meters, wholesale and retail, are subject to inspection and are approved or rejected depending on the findings by the employees of the bureau.

Tank trucks used for the delivery and/or sale of liquid petroleum products must conform to all official specifications and requirements applicable to this type of equipment. Anti-freeze compounds for protecting cooling systems of motor vehicles against freezing damage are subject to test and approval before sale to the public.

The bureau determines and establishes the tare weight of containers used by processors, shippers or other handlers for delivery to their places of business of edible agricultural commodities.

The bureau maintains general supervision over the respective county sealers and deputy county sealers.

DIVISION OF ANIMAL INDUSTRY

DR. J. E. STUART, Chief

The Division of Animal Industry includes the Bureaus of Livestock Disease Control, Dairy Service, Meat Inspection and Livestock Identification.

BUREAU OF LIVESTOCK DISEASE CONTROL

DR. H. P. BONNIKSON, Chief; DR. H. G. WIXOM, Assistant Chief

The welfare of California livestock and poultry is dependent to a great extent on the control and prevention of communicable diseases. This bureau maintains a program of general livestock and poultry disease prevention, both eradication and control, accomplished by means of inspections, quarantines, and laboratory findings. It operates on the basis that control measures are most effective when carried out promptly.

Supervising state veterinarians stationed in various districts of California become familiar with livestock and poultry conditions and problems in their respective sections. In addition to supervising bovine tuberculin testing, they are readily available to investigate infectious diseases or other troubles causing losses, and can start control measures promptly.

The Bureau of Livestock Disease Control works closely with the federal, state, county and city health officials and practicing veterinarians in California in taking steps to discover and prevent the spread of animal pests or pathological conditions. In the field there is close cooperation with county livestock inspectors.

This bureau also has specialists in swine, sheep, and poultry diseases who make investigations, confer with owners regarding problems and cooperate with practicing veterinarians regarding unusual disease conditions.

At present the Bureau of Livestock Disease Control is cooperating with the Federal Government in directing a state-wide voluntary campaign to control brucellosis through vaccination of calves. Vaccination of female dairy calves 6-12 months of age is mandatory.

Importation of livestock constitutes a possible means of bringing into California animal diseases occurring in foreign countries or other states. The law specifies requirements for the importation of different classes of animals.

Inspectors of the Bureau of Plant Quarantine cooperate in checking activities on incoming ships with reference to livestock importations, possible animal disease carriers and garbage disposal, also checking livestock importations at the highway border stations.

For the purpose of close supervision and prompt disease control, branch offices are maintained in Los Angeles, San Francisco, Eureka, Fresno, Modesto, Marysville, Redding, San Luis Obispo, and San Bernardino.

To assist in the diagnosis of livestock and poultry diseases, laboratories are maintained in San Gabriel, Petaluma, Sacramento, Turlock, and Fresno.

A pullorum disease testing laboratory in Sacramento, the facilities for which were provided by the California poultry industry, is supervised by the bureau.

BUREAU OF DAIRY SERVICE

O. A. Ghiggoile, Chief; Dr. M. E. McDonald, Assistant Chief

The function of the bureau is enforcement of provisions of the Agriculture Code relating to inspection and sanitation of milk and milk products. These laws protect and regulate dairy products from the standpoint of public health, and the dairy industry from the standpoint of fraudulent and deceptive trade practices.

Through enforcement activities high standards of quality are maintained for all dairy products and many dairy by-products offered for sale in California. The manufacture and sale of unwholesome or adulterated dairy products are strictly prohibited, as are deception and fraud in the manufacture, advertising, purchase and sale of milk, milk products and imitation dairy products.

This bureau enforces state laws to prevent the use of illegal milk and milk products containers and inspects hundreds of thousands of milk containers each year for legal ownership.

Control and protection of market milk is carried on mainly by surveys and inspections of dairies, milk plants and laboratories, and the collection of samples for bacteriological and chemical determinations. Much of this latter work is done by city inspection services holding State Department of Agriculture approval.

The director of agriculture is authorized to use the Bureau of Dairy Service in establishing and conducting milk inspection services in California areas where approved inspection is not otherwise maintained.

Milk and cream delivered at milk products plants for the manufacture of butter, cheese, evaporated milk, powdered milk, etc., are graded on the basis of chemical, bacteriological and physical tests of quality determination. Milk is graded by direct microscopic count, sediment, temperature, alcoholic, and flavor and odor tests. Cream is graded by the modified volumetric acidity test, sediment test, flavor, and odor. Through this grading system, an accurate examination is made daily on the products of thousands of dairies. It not only furnishes reliable information on quality, but also supplies an index of dairies using faulty methods. Special attention is devoted to washing, sterilizing and handling equipment, clean milking, cooling of the product, protection from contamination and the health of the employees.

This bureau is the only agency in the State which supervises and checks the weighing, sampling and testing of milk and cream purchases from producers on the basis of its milk fat content. Samples of all milk products are forwarded to the laboratory in Sacramento for chemical and bacteriological determinations and the results of these laboratory examinations are used in follow-up field investigations and activities. In addition to bacteriological and chemical determinations on samples of milk products, the work in the laboratory includes checking various chemicals used in connection with the dairy industry and checking the accuracy on all milk fat testing glassware used in California to be sure it is calibrated accurately.

BUREAU OF MEAT INSPECTION

DR. GEOFFREY A. BOYD, Chief

The bureau enforces the State Meat Inspection Law, which provides that the slaughtering of animals, and the preparation of meat food products in counties of over 28,000 population, shall be done in establishments operating under federal, state, or state-approved meat inspection.

The bureau supervises the inspection of establishments operating under approved municipal inspection and provides inspection in other plants doing a strictly intrastate business. It inspects foreign cold storage meat arriving for sale in California and issues licenses to importers, wholesalers, retailers, or restaurants ordinarily handling such meat. It also enforces those sanitary provisions of the Agricultural Code relating to construction requirements in meat packing and processing plants. All plans for construction must be submitted for approval.

A meat inspection laboratory is maintained in Sacramento for the examination of samples of various meat products and miscellaneous materials, including meat and meat products, edible oils and fats, curing materials, cereals, spices and condiments, ink and ink ingredients.

Each year large quantities of fresh and processed meats are condemned as unfit for human food.

BUREAU OF LIVESTOCK IDENTIFICATION

LOGAN D. MORTON, Chief; PAUL G. ROBERTSON, Assistant Chief

Through registration and licensing of livestock brands, this bureau aids in protecting owners against theft. It records cattle brands, issues a state brand book, licenses cattle and horse slaughterers, inspects cattle for marks and brands at shipping points, slaughtering plants, public auction salesyards, union stockyards, and inspects horses at slaughterhouses only; cooperates with state and county law enforcement officers investigating crimes involving livestock and issues cattle auction salesyard licenses.

Through cooperation with livestock owners and peace officers, estray or stolen livestock valued at thousands of dollars are returned to owners each year. Cattle, sheep, and horses reported lost, estrayed or stolen are listed in the bureau's weekly estrayed notice which is mailed to the state brand inspectors and to the sheriffs throughout California. This notice also lists estrayed animals recovered and estrayed livestock being advertised for sale.

Estrayed animals, whose owners are unknown, are sold through public markets at open competitive bids. Proceeds received from these sales are held in trust for one year, during which time a claimant, who can present satisfactory proof of ownership, is refunded the net amount of the sale.

A cattle theft investigator with a crew of relief inspectors cooperates with county sheriffs, game wardens and the highway patrol in maintaining road blocks and night patrol to check vehicles hauling livestock. The number of cattle thefts have decreased during the past year. Grand theft convictions have increased in a ratio to the total number of complaints issued. Conviction of cattle stealing is a felony. A few who have pleaded guilty and were convicted were sentenced to state prison, but a majority were given county jail sentences and placed on probation.

DEPARTMENT OF AGRICULTURE

ADMINISTRATION

A. A. Brock ---------- Director
W. C. Jacobsen ---------- Deputy Director
Dr. A. G. Boyd ---------- Assistant Director
C. H. Perkins ---------- Fiscal Officer
Chas. P. Cusick ---------- Personnel Officer
Charles H. Kinsley ---------- Regional Coordinator, San Francisco
John B. Steinweden ---------- Regional Coordinator, Los Angeles
Romain Young ---------- Regional Coordinator, Sacramento
Clifford Clower ---------- Photographer
Merle Hussong ---------- Public Information Officer
Edna Willis Gaskill ---------- Editorial Assistant

Division of Plant Industry

Chas. V. Dick, Chief

Bureau of Entomology, H. M. Armitage, Chief; Robert W. Harper, Assistant Chief
Bureau of Plant Quarantine, A. P. Messenger, Chief
Bureau of Plant Pathology, Gilbert L. Stout, Chief; George E. Altstatt, Assistant Chief
Bureau of Rodent and Weed Control and Seed Inspection, W. S. Ball, Chief
Bureau of Field Crops, V. O. Wolcott, Chief; W. L. Hunter, Assistant Chief
Bureau of Chemistry, Allen B. Lemmon, Chief; R. Z. Rollins, Assistant Chief

Division of Animal Industry

Dr. J. E. Stuart, Chief

Bureau of Livestock Disease Control, Dr. H. P. Bonnikson, Chief; Dr. H. G. Wixom, Assistant Chief
Bureau of Dairy Service, O. A. Ghiggoile, Chief; Dr. M. E. McDonald, Assistant Chief
Bureau of Meat Inspection, Dr. G. A. Boyd, Chief
Bureau of Livestock Identification, Logan Morton, Chief; Paul G. Robertson, Assistant Chief

Division of Marketing

C. J. Carey, Chief

Bureau of Markets, W. J. Kuhrt, Chief; E. W. Braun, Associate Chief
Bureau of Market Enforcement, J. C. Harlan, Chief; H. S. Cann, Assistant Chief
Bureau of Market News, George K. York, Chief; Walter J. Englund, Assistant Chief
Bureau of Milk Control, D. A. Weinland, Chief; W. J. Hunt, Jr., Assistant Chief
Bureau of Agricultural Statistics, George A. Scott, Chief; R. E. Blair, Assistant Chief
Bureau of Fruit and Vegetable Standardization, H. W. Poulsen, Chief; S. R. Whipple, Assistant Chief
Bureau of Shipping Point Inspection, W. F. Allewelt, Chief; H. W. Peterson, Assistant Chief
Bureau of Weights and Measures, J. E. Brenton, Chief; Burris G. Wood, Assistant Chief

LIST OF COUNTY AGRICULTURAL COMMISSIONERS

July 1, 1953

County	Commissioner	Address
Alameda	Gordon B. Laing	Courthouse, Oakland 7
Amador	Raymond Rebuffo	Chamber of Commerce Bldg., P.O. Box 74, Jackson
Butte	Fred R. Platt	Agricultural Bldg., P.O. Box 1229, Oroville
Calaveras	H. L. Leonard	P.O. Box 398, El Dorado St., San Andreas
Colusa	Fielden F. Swim	617 Market St., Colusa
Contra Costa	A. L. Seeley	Buchanan Airport, Concord
Del Norte	L. J. Garrett, Jr.	Crescent City
El Dorado	Lowell Mobley	Government Center, P.O. Box 587, Placerville
Fresno	John Wardle Dixon	1730 Maple Ave., P.O. Box 801, Fresno
Glenn	P. V. Harrigan	Memorial Bldg., Willows
Humboldt	Donald W. Thomas	833 Sixth St., P.O. Box 486, Eureka
Imperial	B. A. Harrigan	Couthouse, El Centro
Kern	Charles W. Grimm	2610 M St., P.O. Box 946, Bakersfield
Kings	L. O. Haupt	221 Lacey Blvd., Hanford
Lake	Rex Lyndall	Kelseyville
Lassen	E. B. Fix	Veterans' Memorial Bldg., Susanville
Los Angeles	H. J. Ryan	808 N. Spring St., Los Angeles
Madera	Howard T. McLean	221 W. Seventh St., Madera
Marin	Thos. W. Peryam	County Library and Office Bldg., P.O. Box 207, San Rafael
Mendocino	Norman G. Buhn	Room 12, New Courthouse, P.O. Box 689, Ukiah
Merced	E. A. Danison	740 22d St., Merced
Modoc	Loring White	P.O. Box 578, Alturas
Monterey	Peter A. Kantor	Agricultural Bldg., 120 Wilgart Way, Salinas
Napa	Gene Cornett	1436 Polk St., Napa
Nevada	Leonard G. Lageson	Memorial Bldg., Grass Valley
Orange	Dixson W. Tubbs	9846 S. Harbor Blvd., Anaheim or 1104 W. Eighth St., Santa Ana
Placer	Wm. H. Wilson	130 Maple, Auburn
Plumas	E. B. Bond	Quincy
Riverside	Wm. H. Wright	Courthouse, Riverside
Sacramento	A. E. Morrison	120 Courthouse, Sacramento
San Benito	Ward B. Saunders	Courthouse, Hollister
San Bernardino	H. A. Crane	566 Lugo Ave., San Bernardino
San Diego	Dean F. Palmer	Bldg. 2, Operations Center, San Diego 10 Mail Address: Old San Diego Station, P.O. Box G, San Diego
San Francisco	W. F. Carroll	Agriculture Bldg., Embarcadero at Mission, San Francisco
San Joaquin	Austin Mahoney	1868 E. Hazelton Ave., P.O. Box 1809, Stockton
San Luis Obispo	Thos. Chalmers	1025 Palm St., P.O. Box 637, San Luis Obispo
San Mateo	Max J. Leonard	Agricultural Bldg., Chestnut and Heller, Redwood City
Santa Barbara	Walter S. Cummings	Courthouse, P.O. Box 127, Santa Barbara
Santa Clara	David T. Rayner	Hall of Justice, San Jose
Santa Cruz	Matt Mello	602 E. Lake Ave., P.O. Box 590, Watsonville
Shasta	B. F. Stroup	County Office Bldg., 1835 Placer St., Redding
Siskiyou	Dudley F. Zoller	Courthouse Annex, Yreka
Solano	Geo. A. Pohl	Library Bldg., Fairfield
Sonoma	Percy F. Wright	Courthouse, Santa Rosa
Stanislaus	Milo M. Schrock	Burney Villa, P.O. Box 108, 416 15th St., Modesto
Sutter	T. D. Urbahns	Mission Hall, 459 Second St., Yuba City
Tehama	S. T. Ancell	Agricultural Bldg., P.O. Box 30, Red Bluff
Tulare	Oscar L. Hemphill	200 N. Church St., P.O. Box 1149, Visalia
Tuolumne	H. H. Sherrard	Veterans' Memorial Hall, P.O. Box 475, Sonora
Ventura	Chester J. Barrett	Agricultural Bldg., 815 Santa Barbara St., Santa Paula
Yolo	Chas. H. Hardy	Courthouse, P.O. Box 175, Woodland
Yuba	Arthur W. Worledge	P.O. Box 264, Marysville

COUNTY SEALERS AND DEPUTY STATE SEALERS OF WEIGHTS AND MEASURES

County	Name of officer	Title	Address
Alameda	W. A. Kerlin	County Sealer	333 Fifth St., Oakland
Alpine	State Department	Deputy State Sealer	1125 10th St., Sacramento 14
Amador	Raymond Rebuffo	County Sealer	Museum Bldg., Jackson
Butte	Homer M. Byrne	County Sealer	796 E. Seventh St., Chico
Calaveras		Deputy State Sealer	El Dorado Ave., San Andreas
Colusa	F. F. Swim	County Sealer	617 Market St., Colusa
Contra Costa	F. J. Biglow	County Sealer	Room 129, Hall of Records, Martinez
Del Norte	L. J. Garrett, Jr.	Deputy State Sealer	Hall of Records, Crescent City
El Dorado	Lowell D. Mobley	County Sealer	Government Center, Placerville
Fresno	Frank S. Granger	County Sealer	1730 S. Maple Ave., Fresno 1
Glenn	P. V. Harrigan	County Sealer	Memorial Bldg., Willows
Humboldt	H. M. Amner	County Sealer	825 Sixth St., Eureka
Imperial	B. A. Harrigan	County Sealer	Courthouse, El Centro
Inyo	C. R. Wedertz	Deputy State Sealer	738 Kingsley St., Bridgeport
Kern	A. D. Rose	County Sealer	1116 E. California Ave., Bakersfield
Kings	E. W. Broaddus	County Sealer	221 Lacey Blvd., Hanford
Lake	Rex Lyndall	County Sealer	Rt. 1, Box 315-C, Kelseyville
Lassen	Ernest E. Fix	Deputy State Sealer	Memorial Bldg., Susanville
Los Angeles	C. M. Fuller	County Sealer	3200 N. Main St., Los Angeles 31
Madera	G. L. Hartwell	County Sealer	Welfare Bldg., Madera Ave., Madera
Marin	Kenneth Brown	County Sealer	1711 Grand Ave., San Rafael
Mariposa	Jack A. Rahilly	Deputy State Sealer	1736 N St., Merced
Mendocino	Jay Lee Smith	County Sealer	Smith Lane, Redwood Valley
Merced	E. A. Danison	County Sealer	740 22d St., Merced
Modoc	Loring White	Deputy State Sealer	Lederer Bldg., Alturas
Mono	C. R. Wedertz	Deputy State Sealer	738 Kingsley St., Bridgeport
Monterey	Howard C. Sweet	County Sealer	26 Central Ave., Salinas
Napa	R. E. Butler	County Sealer	Rt. 1, Box 612-B, St. Helena
Nevada	L. G. Lageson	Deputy State Sealer	Memorial Bldg., Grass Valley
Orange	D. W. Tubbs	County Sealer	9846 S. Harbor Blvd., Anaheim
Placer	Wendell E. Nelson	County Sealer	Courthouse, Auburn
Plumas	E. B. Bond	Acting Sealer	Quincy
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San Bernardino	H. E. Sandel	County Sealer	566 Lugo Ave., San Bernardino
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San Joaquin	O. T. Melton	County Sealer	1868 E. Hazelton Ave., Stockton
San Luis Obispo	A. B. Hitchcock	County Sealer	1221 Vine St., Paso Robles
San Mateo	W. H. Frey	County Sealer	553 Alhambra Way, San Mateo
Santa Barbara	Clyde A. Page	County Sealer	121 E. Anapamu St., Santa Barbara

COUNTY SEALERS AND DEPUTY STATE SEALERS OF WEIGHTS AND MEASURES—Continued

County	Name of officer	Title	Address
Santa Clara	Edmund D. Cox	County Sealer	215 N. First St., San Jose 13
Santa Cruz	J. B. Nelson	County Sealer	555 Ocean St., Santa Cruz
Shasta	J. R. Scott	Deputy State Sealer	P.O. Box 560, Redding
Sierra			
Siskiyou	D. F. Zoller	County Sealer	Courthouse Annex, Yreka
Solano	Stuart Burk	County Sealer	17 Eighth St., Vallejo
Sonoma	Claude E. Johnston	County Sealer	Courthouse, Rm. 117, Santa Rosa
Stanislaus	Milo M. Schrock	County Sealer	416 15th St., Modesto
Sutter	K. E. Covington	Deputy State Sealer	459 Second St., Yuba City
Tehama	Steve T. Ancell	County Sealer	Agricultural Bldg., Red Bluff
Trinity		Deputy State Sealer	1125 10th St., Sacramento 14
Tulare	F. C. Johnston	County Sealer	5 mi. W. of Visalia on Hwy. 198. P.O. Box 175, Visalia
Tuolumne	H. H. Sherrard	Deputy State Sealer	Memorial Hall, Washington St., Sonora
Ventura	Everett H. Black	County Sealer	54 N. California St., Ventura
Yolo	Chas. H. Hardy	County Sealer	Courthouse, Woodland
Yuba	Chester Wicker	Deputy State Sealer	14th and I St., Marysville

CALIFORNIA COUNTY LIVESTOCK INSPECTORS

Alameda	Dr. E. G. LaDonne	1131 13th Ave., Oakland
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Kings	Dr. E R. Braun	1313 N. Irwin St., Hanford
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San Benito	Dr. G. J. Freiermuth	Rt. 1, Box 49A, Hollister
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Santa Barbara	Dr. A. S. Larsen	708 E. Ocean Ave., Lompoc
Shasta	Dr. C. J. Ferreira	P.O. Box 958, Redding
Siskiyou	Dr. C. E. Carter	Box 412, Yreka
Sonoma	Dr. H. W. Campbell	2002 Fourth St., Santa Rosa
Stanislaus	Dr. C. M. Steiger	Rt. 6, Box 1505, Modesto
Tehama	Dr. J. B. Giambroni	P.O. Box 782, Red Bluff
Ventura	Dr. A. L. Metz	Box 614, Oxnard
Yolo	Dr. S. M. Foster	430 College St., Woodland (P.O. Box 855)

JAPANESE DODDER, *Cuscuta japonica* Choisy.

In 1948 a shipment of Kudzu seed from Japan was found to contain seed of an unidentified species of dodder. Specimen seed were deposited in the seed herbarium of the California Federal-State Seed Laboratory for future reference. In the spring of 1953 another shipment of Kudzu seed from Japan through a California port was found to contain similar dodder seed; identification of the species could not be made from the standard reference material available in the laboratory.

A few of the seed were germinated and grown upon a suitable host plant, as the dodder is a parasite dependent upon green plants for nourishment. It proved to be particularly large, vigorous, capable of rapid growth, and very destructive to the host plants upon which it fed. The potential threat of this foreign parasitic plant entering the Country was defeated through the destruction of its seed in this shipment, but more information about it was desired for future control should it again appear.

Seed were sent to Dr. Truman G. Yuncker of DePauw University at Greencastle, Indiana, an authority on the genus *Cuscuta*, or dodder. Dr. Yuncker was at that time on an expedition to the Tongan Islands somewhat northeast of New Zealand. Upon his return he promptly identified the seed as *Cuscuta japonica* Choisy, a common Japanese species.

Seed of this dodder, and specimen plants, are being prepared for use in its identification should the seed appear either in future foreign shipments or among cultivated plants from areas to which it may have been shipped in the past. This species is not known to have been found in California, but a check is being made to see if reports of its presence have been made through herbarium collections at educational and research institutions in this State.

Many of the common noxious and troublesome weeds that plague the farmer today were introduced from foreign lands, particularly before the passage of state and federal laws which today are implemented to prevent the entry of these and other undesirable weed seed into American agricultural crops.—Rodney D. Cobb

OCCURRENCE OF UGLY-NEST CATERPILLAR IN CALIFORNIA

By Robert P. Allen
Bureau of Entomology
State Department of Agriculture

On June 17, 1952, in the vicinity of McCloud, Siskiyou County, California, the writer found numerous webs, or nests, full of small caterpillars, enveloping branches of native bitter cherry, *Prunus emarginata* (Dougl.). H. H. Keifer of this bureau identified the species as the Ugly-nest caterpillar, *Archips cerasivorana* (Fitch).

Ugly-nest caterpillar was described by Asa Fitch in 1856 as *Lozotaenia cerasivorana.* It has been assigned by later writers and at various times to *Tortrix, Cacoecia,* and *Archips.* Apparently native to the northeastern United States, it has long been known as a pest of choke cherry and sometimes other hosts across the northern states and southern Canada to Washington and British Columbia. Dyar (1902), Kearfott (1905), and Essig (1926) include California in its range, but no substantiating collection records nor specimens have been found.

Inquiries among lepidopterists finally disclosed that Dr. W. Harry Lange, Jr., of the University of California at Davis had collected larvae, pupae and adults of *Archips cerasivorana* on choke cherry and Sierra plum, *Prunus subcordata,* at McCloud and at Mt. Shasta City, 12 miles west, on July 7, 1941. Identification of these moths was confirmed by Dr. J. F. Gates Clarke of the USDA Bureau of Insect Identification. The author is greatly indebted to Dr. Lange for collection records and the photographs used in this article.

Limited observations of the habits of this ugly-nest caterpillar in California agree with life histories recorded elsewhere. Of these, Baird (1918), and Dudley (1918), are among the best. Eggs are deposited in late July and early August in large flattened masses on the bark. (Fig. 1-b.) There is very little development of the embryo until the following spring. The larvae hatch in late May and early June, and construct a tightly webbed nest which they gradually extend over the foliage on which they feed. (Fig. 2.) Later, inside the nest, they construct silk-lined cells in which they live individually. As many as 250 larvae have been found in one nest. They are a dirty yellowish green in color, very active, and attain a length of nearly one inch. There are six larval instars. (Fig. 3.) Pupation takes place within the nest, and prior to moth emergence, the pupae work their way to the outer portion of the nest. (Fig. 3.) Emerging moths leave the empty pupal cases protruding conspicuously. The bright ochre-yellow moths vary considerably in size, but typically have a wingspread of slightly less than one inch. (Fig. 1-a.) They do not disperse far unless carried by wind. There is but one annual generation, and overwintering is entirely in the egg stage.

FIGURE 1-a. Adult moths of the Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch). Upper—male; lower—female.

FIGURE 1-b. Egg masses of the Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch).

FIGURE 2. Webbed nest of the Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch).

Consensus among entomologists is that ugly-nest caterpillar is of little economic importance, since choke cherry, an unimportant native shrub or small tree, is the usual host. Forest workers have been concerned only because of the unsightly appearance of large numbers of nests along roadsides. However, there are numerous references to sporadic and severe

FIGURE 3. Left: Mature larvae of the Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch). Right: Exposed pupae.

infestations on other hosts. These include apple, birch, domestic cherry, Lombardy poplar, and raspberry. Dudley (1918) (1919) showed grave concern over the threat to orchards in Maine, but remarked a year later that this caterpillar had been eradicated in many towns in that state. Ruhman (1935) recorded the reappearance of ugly-nest caterpillar on wild cherry in British Columbia in 1934, after an apparent absence of 17 years. This tendency to disappear rather suddenly after building up a large and destructive population may be due to numerous parasites. Among these the more notable are a tachinid fly, *Dichaetonuera leucoptera* Johnson, and *Nemorilla maculosa* Meig., another dipterous parasite. In the nests collected by Dr. Lange, an undetermined chalcid wasp occurred in large numbers.

Infestation at McCloud in 1952 was limited to the immediate vicinity of that town and confined to choke cherry, although many cultivated cherry trees and other recorded hosts were available. Extensive travels during early summer over eastern Siskiyou and northern Shasta Counties, where choke cherry is common and generally distributed, disclosed no other infestations. On the basis of its known habits ugly-nest caterpillar does not rank as a potentially serious pest, but it should be regarded with suspicion because of its sporadic outbreaks and attacks on cultivated hosts.

Archips cerasivorana (Fitch) with wings spread is 20 to 24 mm. across. (Fig. 1a.) The forewings are orange-yellow in color, with smoky dusting, and dark spots along the front or costal edge. The hindwings are bright orange-yellow. This species is closely related to the well-known fruit tree leafroller, *Archips argyrospila* (Wek.) as genital studies indicate. The differences between the two are as follows:

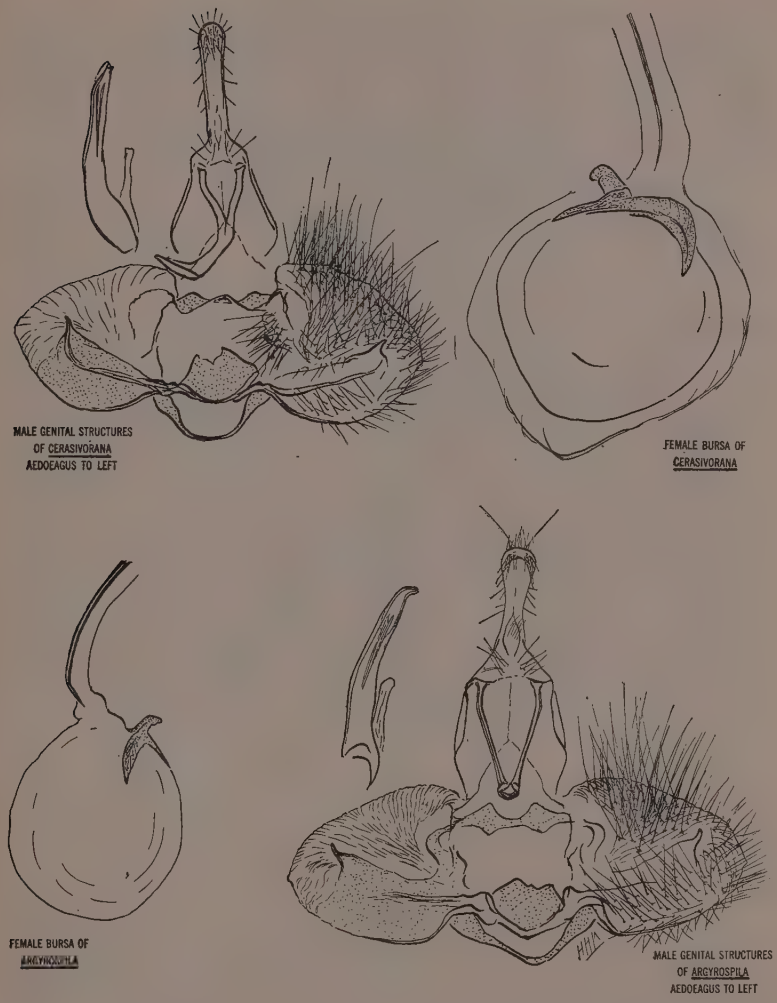

FIGURE 4. Genital structures of male and female of the Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch).

A. cerasivorana: Forewings orange-yellow, generally and lightly dusted with fuscous, and with fuscous spots on the costal margin; the antapical costal spot relatively small and quadrate. Hindwings shining orange-yellow. Male genitalia (Fig. 4) with spatulate uncus, sides nearly parallel; gnathos with supporting fork about one-half its length; tegumen strongly expanding toward the anterior; harpes broad, the clasper bent outward; aedoeagus with terminal denticle. Female bursa with comparatively large hook-like signum.

Archips argyrospila: Forewings golden yellow, fuscous dusted at base; an oblique dark band running diagonally outward across wing center; antapical costal spot semicircular. Hindwings fuscous. Male genitalia with uncus spatulate but distinctly enlarged apically; forks at base of gnathos at least three-fourths length of gnathos; tegumen sub-parallel sided; clasper bent inwardly at tip; aedoeagus with curved tip but no denticle. Female bursa with smaller hook-like signum. (Fig. 4.)

The caterpillars of the two species are very similar in size and appearance, with *cerasivorana* being lighter in color and having a less strongly developed internal denticle inside the mandible.

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CURRENT INSECT NOTES

H. M. Armitage, Chief, Bureau of Entomology
California Department of Agriculture

The rice leaf miner, *Hydrellia griseola* var. *scapularis* Loew, caused considerable damage to rice in Sacramento and San Joaquin Valleys during June and July, 1953. The species has been previously reported as damaging rice in California and it is believed that the unusually cool spring this season has been responsible for so weakening plant growth as to favor population build-up of the fly to epidemic numbers. It has many hosts, besides rice, on which it is capable of surviving. Extensive control measures involving the application of eight ounces of dialdrin per acre to approximately 200,000 acres were successfully used against this outbreak in California.

Since the original recent discovery of the pear psylla, *Psylla pyricola* Forster, in California at Hilts and Hornbrook in Siskiyou County and Gasquet in Del Norte County, additional survey by state and county entomologists has revealed infestations near Yreka (July 22, 1953) and in the Scott Valley (July 22, 1953) in Siskiyou County, and at Darlingtonia (July 7, 1953), Smith River (July 8, 1953) and Crescent City (July 27, 1953) in Del Norte County.

Federal authorities have stated that generally speaking the Mormon cricket, *Anabrus simplex*, as restricted to certain western states, is in the third season of a 10-year upward cycle. During 1952, cricket bands reaching epidemic numbers were recorded as migrating over a 30-mile strip along the California-Nevada line, from Peavine in Sierra County northwards to Doyle in Lassen County. Limited control effort at that time held the infestation against the state line. Late in the season other bands were located east and west of Madeline in Lassen County, which in the spring of 1953 required that more than 8,000 acres be brought under teatment. This action is expected to reduce the infestations to noneconomic status for some years to come, thus breaking this upward cycle. Crickets were of least concern in California in the Milford area of Lassen-Plumas Counties during the period 1941-1942.

Predictions for the 1953 grasshopper season included expectations for valley grasshopper, *Oedaleonotus enigma*, predominance over many localized areas. In the foothills of Kern County, from Maricopa eastward 50 miles to Edison, the economic threat to adjacent crop lands by this species became widespread during May. Early drying of range feed had accentuated hopper movement into high value crops. Control applications of aldrin, applied to more than 110,000 acres, were carried out by county-federal-state and grower cooperation prior to egg-laying activities. These controls were very successful and should alleviate the situation for several seasons to come.

A single example of the smaller European elm bark beetle, *Scolytus multistriatus* Marsh, was collected in flight at West Arcadia, Los Angeles

County, California, July 30, 1953, by D. R. Estes, Los Angeles County Agricultural Inspector. This represents the first time this species has been collected in Los Angeles County. This beetle is the known vector of the Dutch elm disease and would act in that capacity if an infection ever became established in California. The bark beetle was originally found on the San Jose State College campus, Santa Clara County on March 1, 1951, where it was breeding in various species of elms. It has since been taken at Highland, Mentone, Ontario, Redlands and San Bernardino, all in San Bernardino County, during 1952.

A heavy infestation of a new species of gnat, belonging to the genus *Paratendipes* (Tendipedidae) proved troublesome to fishermen in the Napa River marshes in Napa County. According to H. H. Keifer and E. T. Gammon, department entomologists, who investigated this infestation at the request of Gene Cornett, Napa County Agricultural Commissioner, the gnats were very numerous, lurking under piers, in small houses and in mud cracks around the Leslie Salt Basin. The species is nonbiting, although it is very annoying because of its habit of crawling around the eyes and in the ears. W. W. Wirth, dipterologist of the Federal Bureau of Entomology and Plant Quarantine, made the determination.

The Stellate Oak phylloxera, *Phylloxera stellata* Duncan, was found for the first time in California at several different locations in the City of San Diego by R. J. Buckner, of the San Diego County Department of Agriculture. The determination was made by F. L. Blanc, department taxonomist. Although this insect does considerable damage to the foliage of its host, its agricultural importance is minimized by the fact that it infests only an apparently undescribed species of "scrub oak," common to the area. It is reasonable to assume that this phylloxera has been in the area for a long time as subsequent survey has found it at widely separated points in the City of San Diego.

Another aphid, the poplar aphid, *Asiphum pseudobyrsa* Walsh, was found in North Sacramento, Del Paso Heights area, June 30, 1953, infesting poplar and cottonwood, by Larry Schacker, Sacramento County Department of Agriculture. This is the first record west of Colorado. Here, again, F. L. Blanc, department taxonomist, was responsible for the determination of the species. The possibility that the alternate host of this aphid might be an important agricultural root crop indicates the advisability of further investigation of this species. Even though the aphid is common in the Eastern States, west to the Rocky Mountains, aphidologists have not found the alternate host of the species, which may or may not be of economic importance.

The Oregon grape white fly, *Aleuroplatus berbericolus* Q. & B., was found for the first time in Orange County between the Cities of Buena Park and Anaheim, June 8, 1953, infesting *Mahonia* (Oregon Grape), by D. H. Byers, Orange County Department of Agriculture. The species has been previously reported from Los Angeles, Sacramento and Siskiyou Counties, indicating a very wide distribution. This white fly is not considered an economic species. The determination was made by Howard L. McKenzie, department taxonomist.

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